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Vol. 130, Number 9

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Paul Bowen photographed the Cessna Citation Sovereign for our cover. The new Sovereign, the third one built, was flying near Cessna's Wichita headquarters. Paul was flying in a Cessna 210 to photograph the Sovereign, and the excellent low-speed flying qualities of the new Citation made it easy to maintain formation with the piston single for a dramatic series of pictures.

78

82

72

33

Pilot Reports

62 **Citation Sovereign**—Cessna delivers the goods in this handsome midsize jet; it has a longer cabin and a 100 cubic foot heated external baggage compartment. The Sovereign can use the shortest runways, offers transcontinental range, has practically perfect brakes and cruises at a speed within a few knots of its competitors. *By J. Mac McClellan*

78 **From 172 to Regional Jet...Making the Transition**—By improving your credentials and working hard, the transition from flying the right seat of a Cessna 172 to piloting the Embraer Regional Jet can become a reality. *By Amy Dodgen*

82 **Piper Upgrades the Meridian**—The Meridian has a new Meggitt Magic 1500 autopilot system and an increased maximum takeoff weight—to 5,092 pounds—enabling it to carry more people and more stuff. *By J. Mac McClellan*

Flying Safely

72 **Avoiding Thunderstorms Airline Style**—Storm avoidance tools vary greatly between GA airplanes and big jet airliners; know the difference. *By Les Abend & Richard L. Collins*

86 **On The Record**—NTSB summary excerpts from a variety of GA accident reports.

88 **Aftermath**—Ducking Under the Weather. *By Peter Garrison*

106 **I Learned About Flying From That**—No. 759. *By Peter E. Laurin*

Training

53 **Listen to the Warnings**—Heed the warnings given by FSS weather briefers or friends prior to embarking on or continuing a flight; they just may save your life. *By Jay Hopkins*

55 ***Flying* Check Ride**—Dave Hock and his Tiger. *By Richard L. Collins*

Flying Opinion

9 **Left Seat**—The Market for Existing Airplanes. *By J. Mac McClellan*

17 **On Top**—Weather Wizardry. *By Richard L. Collins*

92 **Technicalities**—Refugee from Compromise. *By Peter Garrison*

94 **Jumpseat**—Borrowing a 757 for the Day. *By Les Abend*

98 **Flying Lessons**—The Hours that Count. *By Lane Wallace*

102 **Gear Up**—Things an Airliner Can Do that I Can't. *By Dick Karl*

Flying News & Notes

27 **Flying Mail**—No sympathy for airline pilots; Pushing and pulling; Who's flying?

33 **Reporting Points**— WAAS LPV approaches to debut; Personal locator beacon network operational; Bombardier Global 5000 makes public debut

44 **New Products**—Airshow armchair; Electronic Encyclopedia...eViator's Bible

46 **Owner/Operator**—Dassault Falcon Jet breaks ground on paint hangar

49 **Avionics**—Major upgrades coming for Garmin 430, 530 navigators

59 **Calendar**—Cooler Breezes at Last

116 **Countdown to Kitty Hawk**—The Whopper Flying Machine

Flying (ISSN 0015-4806), (Canadian Business 126018209RT), (Canadian Sales Agreement 99155), is published monthly by Hachette Filipacchi Media U.S., Inc., 1633 Broadway, New York, NY 10019. Periodicals postage paid at New York, NY 10001 and at additional mailing offices. Authorized periodicals postage by the Post Office Department, Ottawa, Canada, and for payment in cash. POSTMASTER: Send address changes to *Flying*, P.O. Box 53647, Boulder, CO 80322-3647; (850) 682-7654; fax (641) 842-6101. One-year subscription rate (12 issues) for U.S. and possessions, $26; Canada, $35.82 (includes 7% GST Tax); Foreign, $34; cash orders only, payable in U.S. currency.

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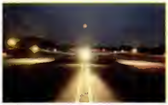

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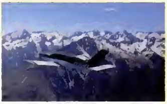

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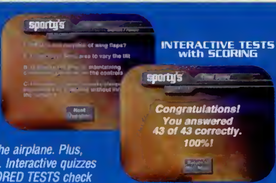

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Left Seat

By J. Mac McClellan

The Market for Existing Airplanes

I DON'T LIKE THE TERM "USED" OR "PRE-owned" applied to airplanes. Those are standards of the automotive industry, and airplanes and cars have next to nothing in common.

The best way to describe an airplane that isn't brand new is "existing." That's the term typically applied to buildings. They are either new or existing. You don't buy a used house, for example. You buy a new house or an existing house. And airplanes have almost everything in common with buildings and real estate but very little similarity to cars and other vehicles.

This may appear to be an exercise in semantics or parsing words, as some of our famous leaders have done in the recent past. But to understand the value of airplanes it is essential that we stamp out our comparisons to automobiles and view airplanes as durable objects possessing very long life potential.

Over the past 10 to 15 years, the value of existing airplanes soared and has only recently retracted some. That has not been true for the entire century of powered flight but is a relatively recent phenomenon. I would date the onset of the appreciation, or at least very slow depreciation, of general aviation airplanes at about the mid 1970s.

About 20 years ago, the Beech Bonanza A36 signaled the change that was ahead for existing airplanes when it became the first popular airplane to be worth more when it was a dozen or so years old than when it was new. Those price comparisons didn't include adjustments for inflation, so the value of the existing Bonanza wasn't actually the same as its new price, but the dollar numbers were the same, and that was new and startling.

Then, in the 1990s, many, in fact most, existing popular high-performance singles saw their values increase to a dollar number substantially greater than when they were new. It happened in other categories of airplanes, such as some models of business jets and the occasional light piston twin, but the run-up in prices was most pronounced in piston singles. Overall economic inflation did some of the work, but the decade of the 1990s was actually a low inflation period compared to the previous two decades, yet the value of existing singles soared in the 1990s.

Two major factors explain the high value of existing singles: First is the rapid inflation of new airplane prices. Second is the maturity of the technology.

For many reasons, including the high cost of product liability insurance and dwindling production volume, the price of new singles pulled ahead of general inflation. Because airplanes have always been expensive, price increases of several percent or more per year compounded into substantial dollar volume price increases. For example, according to *Vref*, a leading value reference of existing airplanes, a Bonanza A36 had an average new price of $330,000 in 1990. By the year 2000 the price for an A36 was up to $530,000. And if you step back 10 more years the A36 new price in 1980 was around $139,000.

When the price of new airplanes goes up, it pulls up the value of existing airplanes. If you think of a new airplane as an alternative, or a replacement, for an existing airplane, an increase in the price of the new airplane makes the existing one more valuable. That's why a 1980 A36 Bonanza is worth about $180,000 today.

The second big reason for the high value of existing airplanes is the maturity of technology in the piston airplane and turboprop category. A new piston or turboprop airplane will have essentially the same performance and utility as existing airplanes. This is not for lack of trying by airplane designers and manufacturers; it is simply the realities of aerodynamics and structures. The efficiency of airfoils, airframes, engines and propellers can be improved only slightly because our understanding of how they work was very complete 40 or 50 years ago. The best minds in the world backed by the unlimited wartime budgets of the biggest governments refined propeller airplanes during World War II and the years leading up to it, so there are only small increments left to improve our understanding of aerodynamics in the propeller speed and altitude range. All-new single-engine airplanes, such as the Cirrus and Lancair, for example, offer some alternatives with high power and fixed landing gear, but they by no means make an existing Bonanza or Saratoga obsolete the way the Boeing 707 did to the Douglas DC-7.

You may think the inability to make major technological advances is a bad thing, and that it signals doom for our favorite activity. But, actually, the situation is reversed. The maturity of propeller airplane technology preserves the value of our investment and reduces the cost of flying over what it would be if technology were able to advance at a rapid pace and leave existing airplanes hopelessly behind.

Here's where my real estate analogy really applies. Let's say that building materials and techniques were advancing at a high rate on the order of recent electronics advances and thus rendering buildings a few years old unattractive. What would that do to the value of your house? Bad news. But the fact that buildings still have a foundation on the bottom, roof on the top and walls in between and that the materials used to create those essentials change little over many years means that your house is your best investment. The building increases in value because it endures, not because it becomes obsolete.

And to continue the housing analogy, the parts of a house that wear, or the technology that changes, is replaceable and portable. For example, you don't tear down the house because it needs a new roof, or new plumbing, or new windows. You replace those items. And when the kitchen cabinets and appliances show their 1960s roots, you don't level the house, you redo the kitchen. Same for the bathroom, where there have been improvements in plumbing and fixtures.

The same applies to an airplane. Like a building, everything that wears is replaced. Engines come and go, interior refurbishment is equivalent to redecorating your home, and the plumbing and wires all get constant attention. And the new technology—primarily avionics—is entirely portable and can be installed in just about any existing airplane. You can also upgrade the engines for more power in many cases, or buy an improved and more efficient propeller. But you don't junk the airplane any more than you level your house because repairs are needed.

At the risk of beating the airplane as real estate analogy to death, I compare the general aviation business to an area of the country such as the Northeast that is highly developed. There is little or no room for large-scale housing developments here near New York City, for example, but new construction does take place when a new house or building is wedged into a lot previously thought undesirable, or when an existing building is torn down and replaced with a new one.

What finishes off a building is economics. Either it has been allowed through neglect to deteriorate to the point that the cost of repairs exceeds the value of the building after the work, or the land has grown in value out of proportion to the existing building.

It's about the same with existing airplanes. Neglect can finish off an airplane in just a few years because the cost of restoring it to airworthy condition can exceed the value of a similar airplane already in good shape. And like the house that is no longer grand enough to match the value of its lot, an airplane can be too low in value to justify the tiedown rent, insurance and other fixed costs, so it gets shuffled off to end its days rotting at some out-of-the-way airport with weeds growing up around its wheels.

So, please, stop calling existing airplanes used airplanes, any more than you call your house a used house. Existing airplanes are the foundation for all flying activity, and the couple thousand new airplanes added to the neighborhood each year support the value of the airplanes already there, and the other way around.

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degree radial of Sparta and then direct to Morristown Airport."

No airways, no intersections, just radials to intercept. And the Westchester One departure is merely a pre-assigned turn after takeoff.

I had the radials dialed in on my Garmin 530 and 430 to get a preview of what this clearance looked like on the moving map. It didn't make much sense, other than it got me out to the northwest away from the New York area traffic. But it was a clearance I could fly, so I took off expecting radar vectors anyway.

As it turned out, I didn't fly the radial of anything. As I turned around to the northwest on the departure procedure, New York Approach gave me a vector to intercept the localizer to Runway 23 at Morristown and track it inbound. A weird clearance actually turned out to be the easiest possible IFR flight through the crowded New York airspace.

Over 80 Club

My insurance agent, Larry Rachlin, has been in the aircraft insurance business for decades working with pilots of all sorts of airplanes. He called me the other day to suggest that we need to write more about older pilots because he was seeing a strong increase in what he is calling the "over 80 club."

Most pilots believe that at some age they will become uninsurable in an airplane even though they meet the certification and training standards of younger pilots. But Larry assures me that isn't true. He has written policies for a number of pilots well into their 80s and sees the trend increasing. That makes sense to me because people are staying healthy longer, and the pilot population is aging. Why not fly into your 80s?

According to Larry, the key to insurance availability as you age is a long-term relationship with a major insurance company such as USAIG or Global. He says insurers are reluctant to cover pilots who are past 70 or so unless they have had years of experience with that individual. If you have been insured by a major company and you are at or approaching the social security age, don't change companies. Larry says that if you stick with a major insurer and agent, they'll stay with you as the years go by.

Nexrad, Lightning and Tornados

Pilots are constantly asking which thunderstorm detection and avoidance device I want the most. Is it a Stormscope to find lightning, an airborne weather radar to see precipitation or one of the new cockpit weather devices that shows Nexrad pictures in flight? A recent trip to Wichita demonstrated why I want them all and can't really choose a favorite for all situations.

Thunderstorms were forecast for most of the 1,300 nm from New York to Wichita, but they were only scattered over the eastern third of the country. The Nexrad picture received by the Garmin GDL 49 satellite receiver showed the activity was south of my route to the fuel stop in Indianapolis. No need for the Stormscope or airborne radar on that leg.

When I looked at WSI's detailed radar picture at the Signature FBO at Indy, I thought I was home free. There were only a few scattered radar returns

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over western Indiana, and nothing over Illinois, Missouri and Kansas. Maybe the forecast storms wouldn't show up after all.

But I began to wonder when the wind at 6,000 feet was blowing 55 knots from the southwest. That much wind in June in that part of the country is never a good sign. Sure enough, the Nexrad picture on the Garmin showed an east-west line of storms developing over central Missouri covering the width of the state. A sigmet describing the line, and noting that it was severe, soon followed. The Stormscope confirmed lightning activity in the Nexrad returns.

In this situation the airborne Nexrad picture was the perfect avoidance solution. I could see on the Garmin presentation that a deviation to the Missouri-Iowa border, instead of cutting across Missouri on the direct route to Wichita, would miss the weather. The big picture on the Nexrad kept me out of the cells, and when it came time to turn toward Wichita, the airborne radar was perfect for going around the few cells that remained at the west end of the line.

Approaching Wichita, the Nexrad picture showed just a couple of tiny isolated returns, and only of Level One and Two. However, my Stormscope was going crazy. All of a sudden several pilots flying east of Wichita started asking for urgent deviations around weather. I wasn't far away but couldn't see the problem on the Nexrad picture or my airborne radar, but the Stormscope indicated that cells were building quickly.

Finally, a couple of small radar targets appeared on my airborne radar, very compact, showing heavy precipitation in the general direction of the Stormscope-detected lightning activity. I gave these little cells a wide berth, landed at Wichita without incident and went directly to the hotel on the airport. When I turned on the local TV news, there were reports of a tornado on the ground near El Dorado, a small town just east of Wichita and in the area where the Stormscope spotted the rapid development of very strong thunderstorm cells.

In one trip Mother Nature treated me to a look at the best features of all three weather avoidance systems in my airplane. Which one would you want to have? Or more important, which one would you leave out? ☐

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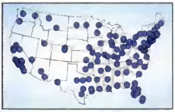

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On Top

By Richard L. Collins

Weather Wizardry

WE HAVE LONG HAD WEATHER information available from the FAA and National Weather Service. But there has also been a demand for custom weather services, and these have developed for aviation interests as well as TV and radio stations and others with a vested interest in Mother Nature's tantrums.

Interest in this reaches a peak in general aviation with the introduction of weather in the cockpit. The up or downlink of weather information, including the Nexrad mosaic, comes from private services. We pay for virtually all of it, so it is a competitive business. The exception to paying comes with part of the Bendix/King system. The metars, TAFs and pilot reports are available free there because of an FAA contract.

Weather Services International, WSI, is a new entrant in the pay-for-view cockpit weather service competition, though it is far from new in the aviation weather business. The company has been around for over 25 years and is a leading weather provider to airlines, corporate flight departments and FBOs. WSI was chosen as the most preferred weather service in a recent *Professional Pilot* magazine poll. Most general aviation pilots are familiar with WSI's user-friendly Pilotbrief systems in FBO planning rooms, and its service is now available in the cockpit with WSI InFlight.

Mac and I reported a few months ago (April) on the systems we have in our airplanes. His is a Garmin system that utilizes a satellite downlink and is a request/reply format. Mine is a Bendix/King system that utilizes a VHF uplink and is a broadcast system, meaning that when signal is being received, all the information is there all the time for you to call up as you might with a computer. VHF coverage with the Bendix/King system is pretty good over a lot of the country as long as you are flying at 10,000 feet or higher. For the uplink system to be truly viable for all general aviation operations, there would have to be two or three times as many broadcast stations as planned.

The WSI system is a downlink system that is also a broadcast system. It thus has all the good of the other two systems and none of the drawbacks.

The Garmin system uses low earth orbit satellites, and there is just not enough capability there for a broadcast system. WSI utilizes a geosynchronous (fixed location in relation to the Earth) satellite that has the power to broadcast. Through advanced electronics and antenna technology, WSI has bypassed the former need to point the antenna at the satellite for best reception, which has previously been an expensive thing to do in an airplane. The system works at any altitude, anywhere in the continental United States, and all the information is there all the time.

As this is written, what you have to do to use the WSI system is install the company's receiver and antenna and then view the product on a suitable laptop, tablet PC or pocket PC. The receiver and antenna for this runs $3,495. GPS input would allow for a moving map with the airplane located on the screen, but there's no provision to show a flight plan. Approval is pending to play through a UPS Aviation Technologies MX20 multifunction display. The receiver for that application will be $4,995. The service for either is $49.95 a month.

This raises an interesting question. Will many pilots embrace the use of a portable device for viewing weather? In favor is cost. Against is the fact that tablet and laptop PCs don't do well in direct sunlight (the pocket PC does better), the wires to the device, and the fact that they are operated by touching the screen. The latter might work fine on a glassy smooth day, but somehow it is often bumpy as our interest in weather information reaches a peak.

Showing it on the MX20 will remove all these objections, but the market penetration of that unit is not huge, though it offers some unique features (see the following item) that might make it ever more popular. WSI is exploring compatibility with other multifunction displays.

The desirability of WSI InFlight is strong, and as I examined the output (on the ground) I couldn't help but compare it with the Bendix/King, with which I have a lot of experience, and the Garmin, with which I have a little experience.

To begin, the satellite broadcast system gives a definite advantage over the other two systems. I usually fly at or above 10,000 feet, so the Bendix/King coverage is pretty good for me, though there are still gaps in parts of the country that badly need coverage. The West Virginia/Pennsylvania mountains are the home of some nasty weather, and the uplink coverage is poor in the area. Every time I fly across Clarksburg, West Virginia, I look down and think that would be an ideal location for another Bendix/King uplink station. Mac remarks that sometimes the responses to his requests on the Garmin are slow coming back. The WSI system would handle these drawbacks well.

WSI calls its radar mosaic NOWrad, and it is a highly polished and tweaked product. The returns from the ground radar sites are collected in real time, then a two-step mosaic and clean-up process is applied, using all four Nexrad

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tilts in the process. Then a meteorologist reviews the product before it's beamed to the airplane. This process eliminates false returns and gives a most accurate depiction of the weather.

WSI shows echo tops, has a loop to show movement, and has a two-kilometer resolution, meaning that each block is four square kilometers and that the blocks are colored according to the heaviest return in that block. The Bendix/King resolution is four kilometers, 16 square kilometers to the block, and the Garmin is 12 kilometers, 144 square kilometers to the block. That gives a big advantage to the WSI system.

That advantage has to be tempered with the fact that even a two-kilometer resolution is quite a bit, and, as with all these systems, it means that the radar depiction is good for strategic avoidance and not suitable for close work.

Another thing that affects radar mosaic usefulness is the age of the information, and WSI is the first entity I have talked to that cuts through the chaff and accurately identifies the age.

When the Nexrad radar systems are operating in the "severe weather" mode they complete a sweep every five minutes. That's a 360-degree sweep, including the vertical sweeps to measure echo tops. That means that the oldest information coming out would be five minutes old. It takes WSI a couple of minutes to process and refine this information and then it sends a new picture to the airplane every five minutes. Given that, the information reflected in the picture in the airplane would be a maximum of 12 minutes old before it is updated.

The WSI NOWrad also addresses something that a lot of us have noticed about the other products. They tend to overstate the intensity of precipitation. The WSI system uses higher intensity levels for the yellows and reds. Its system has no magenta, for the heaviest rain, as does the Bendix/King. Couple this lower intensity with the availability of the echo tops and the total information is excellent with the WSI product.

WSI also downlinks winds aloft information every five minutes, though it is compiled once an hour. This isn't available on the other systems. Is this helpful? Certainly as we fly we know the winds aloft at our cruising level. How about a better altitude for wind? As one who has spent a lifetime climbing and descending to mitigate the effects of a headwind, I don't know. Nothing ever seems to help.

Sigmets are shown graphically and can be put into motion. While I was visiting at WSI, though, I saw an example of a sigmet gone wrong. They had one shown as an overlay on the radar picture and almost all the bad looking return on the radar had made it out of the sigmet box. This storm was moving much faster than anticipated, but I thought sigmets were kept more current than that. Whatever, having a graphic depiction of sigmets would be quite useful.

The metars are shown graphically, color coded, and historical displays are available. Metars are blue for VFR, green for marginal VFR, yellow for IFR, red for low IFR and magenta for Category I IFR. The graphic will also show what is making the weather inclement, as in liquid precipitation or visibility obstructions, for example. The graphics will also show if the surface wind is over 20 knots.

From the graphical depiction, which is shown along with the NOWrad picture, just click on any symbol and the text metar and the forecast are available for that airport.

The Bendix/King system in my airplane has a graphic display of metars, and at first I thought of it as a gimmick. The more I use the system, though, the more I use the graphic display to call up the metars that I want. Having a visual picture of where in the area the weather is good and where it is bad is helpful and the details are only a click away.

The Bendix/King and Garmin systems were first and are great, but the WSI system is clearly the next generation. WSI's big challenge is to become compatible with a wide variety of multifunction displays.

The weather uplink/downlink action has been the most excitement we've seen in a while, and we'll be seeing a lot more evolution in weather-in-the-cockpit systems as time runs.

Flight Review

As you may have read here before, every two years Tom Benenson and I get together to give each other a flight review. It is always a challenge to come up with "a review of those maneuvers and procedures that, at the discretion of the person giving the review, are necessary for the pilot to demonstrate the safe exercise of the privileges of the pilot certificate."

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FLYING

ed avionics in his airplane, including an Apollo MX20 multifunction display with the Jeppesen charts stored in it, I thought this review should be mainly avionics oriented. I'd ask him to make all that finery strut its stuff and make sure he really knows how to use it.

He does, but we both learned a few things during the review.

I learned that the depiction of Jepp charts on the MX20 is not really adequate to cause a pilot to toss the bag of paper charts out the window. Because of the shape of the MX20 screen, it's not possible to show the entire chart at once, and it would take a while to get used to pressing buttons to see various elements of the chart.

I think we both learned that with everything that can be depicted on his screen now, when he adds weather and traffic, there will be too much information for one screen. Alas, we have reached a point in the information age where two multifunction displays will be required to adequately cover everything.

> Avionics can't be allowed to be a distraction, and if you set out to do something and any confusion sets in, that's a world-class distraction.

We also both learned that with all this finery, a traffic information system becomes almost a requirement. At one point Tom remarked that he hadn't looked outside in a while. There's just no way to take full advantage of all the information without spending a lot of eye time on the panel. That's not good because while it is a big sky, there are still other airplanes out there.

Another thing that came up is the range selected for the moving map. Tom likes to work it close, but at one point we were to go direct to the Allentown, Pennsylvania, Vortac. Had a greater range been selected for the map, he would have known immediately which way to go.

We were both puzzled by the fact that an approach I wanted him to fly wasn't in his primary GPS database. We later looked in his other GPS and in both my GPS units and that approach was in all of those. Who knows why it was missing in one database?

I couldn't let Tom go without a little basic airmanship display. I asked him to maintain 1,500 feet agl on final until he was at a point where he could make a power-off descent and landing in the touchdown zone. He remarked that he hadn't flown a power-off approach in a long time. Most of us haven't, so it's a good thing to do at review time.

Tom used but 10-degree flaps, and at one point he felt that he was a little high so he slipped the airplane a bit. That worked out, and we landed close to those touchdown zone markings. Then I enjoyed having Tom make me review some of the things that are not often done with the avionics in my airplane.

In both our cases, there is no question that you can't spend enough time navigating through the capabilities of the various displays and systems in the airplane. Avionics can't be allowed to be a distraction, and if you set out to do something and any confusion sets in, that's a world-class distraction.

Weather for the Day

The day we visited WSI to look at its WSI In-Flight system was an interesting weather day. When I left Hagerstown, Maryland, to fly to Bedford, Massachusetts, there was a huge blob of thunderstorms to the west. It was the week of all the tornadoes, so everyone was keeping a close eye on all the red spots on radar.

The activity wasn't supposed to get into Maryland until after lunch, but when I watched it on the uplink flying to Bedford pretty early in the morning, it was closer than had been forecast and seemed to be bearing down rapidly. Where my original weather study suggested that thunderstorms would be the challenge in the Hagerstown area for the return trip that afternoon, I now wondered if the storms might not be farther to the northeast by afternoon.

The neat thing about visiting a weather company is that weather is all over the place all the time. I mentioned that almost all the thunderstorms had found

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their way out of an active convective sigmet area, and that was watched as the time passed. The weather was moving east more rapidly than had been anticipated, and it now looked like the thunderstorm challenge would come well before reaching the Hagerstown area.

There was no radar at lunch and we went to the airport from there. The Bedford weather was all but clear, and they have a Bendix/King uplink station on the field so I didn't bother to visit the weather room. I would be able to see everything in my airplane before takeoff.

What I saw was a pleasant surprise. The area of storms had sagged to the south and there was nothing along my route but some widely scattered green return. What was a surprise was that Hagerstown was reporting low IFR conditions. It had been forecast to be good visibility and 12,000 overcast with thunderstorms in the area. The storms were long gone but the clouds were now low.

There were some bumpy clouds along the way, and they were apparently on the slope of a warm front, or what had a lot of the characteristics of a warm front.

As I got set up for the ILS approach to Hagerstown my first thought was that I'd see if I could hand fly a perfect ILS approach. Then I nixed that idea. The best deal is to let the autopilot fly to have as many things going for the approach to minimums as possible.

My S-Tec autopilot doesn't have a pitch function, but it does a good job of tracking the localizer, especially when the air is reasonably smooth as it was this day. My job was to manage the glideslope and airspeed with pitch and power, monitor the autopilot's management of the localizer and search for a runway or some lights as the airplane neared the decision altitude.

I think that I would have missed this approach had the autopilot not been flying. Why? When you are hand flying, it's not wise to take more than a quick glance ahead as the DA is reached. With the autopilot handling roll and localizer tracking, I could look up, look carefully, see the rabbit and follow it through the murk, still flying the ILS. That worked fine, though the landing was a little long because of a few extra knots on speed and a downwind component of seven knots.

Would I have felt more like a he-man had I hand flown the approach? No doubt about that, but I still liked the way it worked out. ☐

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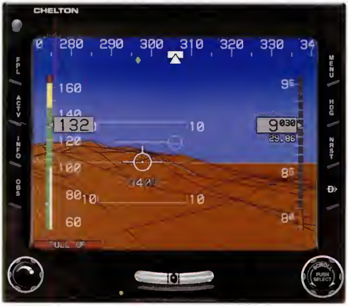

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Feedback from our readers

No Sympathy for Airline Pilots

Cessna Skymaster

Les Abend did a great job of explaining the airline pilot's plight in his "It's Not on the Checklist" (*Jumpseat*, July). Within the general aviation community, however, I don't find a lot of sympathy for the union position held by most airline pilots . . . Surely Les knows (his management does) that there are many highly qualified pilots who would give anything to fly left seat in a 767 for $90,000 a year (half of Les's salary) and consider it a promotion.

David Freeman
Roanoke, Texas

Les Abend's article has to be one of the most fatuous pieces I have ever read in a national periodical. There are lots of people who would gladly change places with him and wax eloquently about how they have the greatest job in the world, flying left seat in a 767. Certainly it has its disadvantages, economic instability being one of them. However, the money is still in the upper reaches, the status is never-ending, and I guess the opportunity to be the biggest prima donna walking is also available.

Steve Gorman
Lotus, California

Les Abend correctly identifies the airline industry as the worst managed business in the country. However, his career education in aviation has left a few blind spots in the realm of economics: 1. The world does not owe you a living. 2. Customers are not required to buy what you are selling. 3. Excess supply cuts prices and margins for both labor and material. Although he wonders if law or medical school would have been a better choice, be assured that professionals in those disciplines are not immune to similar realities. The concept of landing a job that will take care of you for life is seductive but will always remain elusive. To declare that airline pilots, when faced with dissolving careers, have "no other place to go," suggests a profound lack of initiative and imagination. How about devoting some of those hours in the crew lounge to serious planning for your next career?

Ken Ambrose
Orinda, California

Airline pilots are not in touch with the real world and have succumbed to the realities of isolated commiserating. The profession compares itself to doctors; yet there is no comparison between a doctor's education and the pilot who spent three or four years in flight school. And the argument about being entrusted with the lives of the passengers is somewhat off the mark because those two pilots in the "front office" are always the first to the crash site. I don't believe that a pilot flies any more safely when alone or with 400 people behind him. No, Captain, I have real problems trying to feel your pain. I do not think an airline captain is worth $200/hour working a schedule that is, by any other standard, half time. I suggest all of you get your heads out of the clouds, stop your industry's collective whining, and get your financial realities back on the ground with the rest of us.

Mark Neubauer
Cincinnati, Ohio

What makes airline pilots think that they should be immune to the vicissitudes of the present economic downturn? Unemployment is at a several decades high, employee benefits are being eroded everywhere, and working hours are being reduced. The airlines certainly have no monopoly on incompetent, venal, hapless or maybe even dishonest management, nor on being subjected to ill advised government regulation (meddling). Airline pilots have been near the top of the employment food chain for decades. They are now in the same boat with everyone else. Quit whining and welcome to the club.

George Abbott
Raleigh, North Carolina

Any airline pilot has shown a willingness to make a career in an industry that has always been the first to feel a downturn in the economy, exposing that pilot to the uncertainty, instability, and layoffs that airline pilots endure many years into their seniority. Nineteen years ago Captain Abend made the decision to accept his current employment. Around that same time, I was on an identical career path. We were in pursuit of the ultimate—a job with a major airline. I too wanted the ultimate job, but I did not want the ultimate layoff—a layoff 10 years down the road that would cut an income that was well into six figures down to zero. Twenty-one years ago I left what would have been the last step before the major airlines to take a more stable job as an air controller at Cleveland Center, largely so I wouldn't have to endure the unpredictability of the airline industry years down the road. So what's the difference now? The airplanes and the flying I miss. The job of an airline pilot in a career emergency without a checklist, I knew I would not miss.

Mark Solomon
Amherst, Ohio

Way to go, Mark. You get it. Les's job here is to give other pilots a glimpse of the major airline pilot's lifestyle, the choices they made and how it is all working out. Les doesn't sugarcoat the view. The many of you who wrote stating the obvious—that major airline pilots have been highly paid and have enjoyed good working conditions—miss the point. A very desirable career is now far less attractive, and an aviation lifestyle that you certainly envy is on the way out. That is well worth documenting.—Ed.

Pushing and Pulling

If I recall, the ducted cooling fan on the rear engine produces the weird noise on the Cessna 337 "Mixmaster." It

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sounds not unlike a fenestron on some Aerospatiale helicopters. The asymmetric thrust lines could possibly do it, but at roughly equal thrust on the engines, shear between the two lines is insignificant.

JOSE NIETO
San Antonio, Texas

Any pusher propeller airplane sounds different than a tractor design, so the fact that it has one pushing prop could be enough to explain the unique Skymaster sound.—Ed.

We have noticed in the last two articles you have run with comments on pressurized Cessna Skymasters that you vastly understate the number of currently registered P337s. We believe this happens because you are searching for "P337" as a model number in the database. That will return the approximately 50 or so that Richard Collins refers to in his article. However, the correct model number for a pressurized Skymaster is T337GP or T337HP. And many early pressurized models are registered as simply T337G, which looks like a turbocharged but not pressurized airplane, but is in fact pressurized, because there were no turbo-only airplanes built from 1973 to 1977. A search of the database for aircraft with "P337" in the serial number returns 252 entries.

KEVIN MACKENZIE AND KEVIN MCDOLE
Cornelius, Oregon

We believe you are correct, Kevins. The FAA Registry shows the smaller number for "P337" but obviously doesn't include the other designations you found.—Ed.

Who's Flying?

I take issue with something Peter Garrison said in "Heads in the Clouds" (*Aftermath*, July). He said that "normally" the pilot not flying briefs the approach so that the pilot flying can better visualize what is going to happen, etc. I'm just curious in whose world this is "normal." I fly for a commuter airline and I think I can speak for most airline pilots in saying that it is definitely not normal in our world. The pilot flying always hands off the airplane to the pilot not flying so that the pilot who is going to shoot the approach can devote his attention to reading the approach plate and can get the best picture possible of what is supposed to happen. I think more airline standard operating proce-

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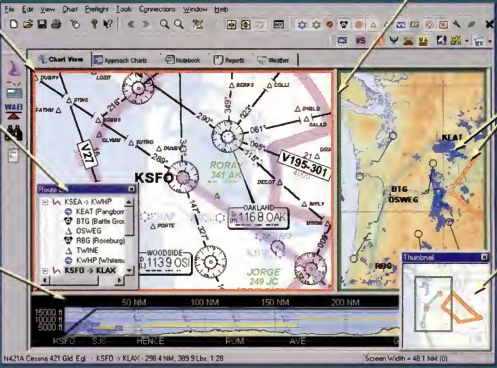

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dures would be put to good use in general aviation.

Jonathan Steen
Richmond, Virginia

Peter was speaking of the moment, not the entire leg of a flight, and, as you describe, it would be normal for the pilot who briefs the approach to not be the one also flying at that instant.—Ed.

Don't forget Toronto

Dick Karl ends his "Meigs, the Mayor and his Midnight Muscle" (*Gear Up*, July) by saying that there are only three remaining useful and picturesque landing strips in the world after the destruction of Meigs Field. I would add Toronto's City Centre Airport to this prestigious list. All of the airports listed seem to have one thing in common: proximity to major centers and island or overwater approaches. City Centre remains one of the most picturesque and useful runways in Canada. Its similarity to Meigs is remarkable. Friends of aviation (general and commercial) have fought and won the battle to keep that airport open.

David West
Toronto, Ontario, Canada

You're right. That's a spectacular view of a great city.—Ed.

Mac's "Airports on the Lake" (*Left Seat*, July) misses the mark. I have flown into Burke Lakefront, Meigs and Cuyahoga County on many occasions. For the general aviation pilot, both Meigs and Burke Lakefront are quite pricey for landing fees, parking and fuel. The crosswind off Lake Erie onto Burke Lakefront is often quite stiff and has had me grounded in the past waiting it out. When you fly into Burke you can also plan on being sent a bill for using Cleveland airspace. Cuyahoga, on the other hand, is easily accessible, more reasonable on price and full service. I suspect Palwaukee has similar advantages. Nevertheless, I have made a personal pledge not to visit Chicago again until Meigs reopens.

J. Kornblum
Jonesboro, Arkansas

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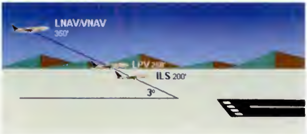
Edited By Robert Goyer



WAAS LPV Approaches to Debut

The FAA's Wide Area Augmentation System (WAAS), which greatly enhances the accuracy, availability and reliability of GPS, was scheduled to debut earlier this summer, and new lower-minimums approaches were planned to be available this month.

The FAA planned to commission WAAS, which has been functioning and usable (though not commissioned) for more than a year, in December. But the agency moved that date up to this summer when prime contractor Raytheon reported this spring that it would finish its work early, at least according to recent schedules. The FAA is an estimated five years behind and $2 billion over budget on WAAS. Technical problems with the availability and reliability of the system, now straightened out, delayed the program.

The FAA planned to have first LNAV (lateral navigation) and VNAV (lateral and vertical navigation) approaches available in July, with minimums down to 350 feet agl (LNAV/VNAV). LNAV/VNAV approaches offer either lateral (side-to-side) navigation or lateral and vertical navigation, even on non-precision approaches.

This fall the FAA plans to publish a handful of approaches with minimums to 250 feet agl, called LPV approaches. The agency says it plans to publish approximately 300 new LPV approaches a year for several years.

Other WAAS capabilities will be phased in over the next several years, including arrival and departure procedures. The FAA plans to add Category I capability approaches (200 feet and half-a-mile visibility) by 2013.

Personal Locator Beacon Network Operational

The National Oceanic and Atmospheric Administration (NOAA) commissioned the personal locator beacon (PLB) network on July 1st. When activated in an emergency, the beacons emit a signal on the 406-megahertz frequency that can be tracked by NOAA geostationary and polar-orbiting satellites (part of a worldwide satellite network). PLBs use GPS to determine their location, which they transmit to the satellite, which relays that information to rescuers.

By law, owners of PLBs are required to register their devices with the NOAA. When a distress signal is received, the NOAA uses this information to call the designated emergency contact to determine the whereabouts of the registered owner.

In the lower-48 United States, PLB distress calls are routed through an Air Force office in Langley, Virginia, which then notifies state rescue or police agencies in the area where the call originated.

PLBs are already available on the consumer market. Prices for the units, which are still generally upwards of $500, are expected to drop substantially as word gets out and demand for them increases.

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Bombardier Global 5000 Makes Public Debut

On its way to the Paris Air Show, the Bombardier Global 5000 long-range business jet made its first public appearance, at a stop at Westchester County Airport in New York. Priced at $33.5 million completed, the 5000 looks to entice customers who don't need the ultra-long legs of the 6,500-nm Global Express but who still want transatlantic or North American transcontinental capabilities at high speeds. The 5000, which Bombardier sees as competing against the Gulfstream 400 (formerly the GIV-SP) and Dassault Falcon 900EX, can fly from Continental Europe to the U.S. Midwest (Paris to Chicago, for instance) at Mach .85 with eight passengers and three crew or from New York to Los Angeles at Mach .89. Bombardier also touts the airplane's takeoff field length of 5,000 feet at maximum weight on a standard day. Pilots type rated in the Global Express will be able to transition to the Global 5000 (and vice versa) with only differences training.

The first flight of the Global 5000 took place on March 7th of this year. Certification by the FAA, Transport Canada and the European JAA is scheduled for the first quarter of 2004, with first deliveries anticipated in late 2004.

Russians Sweep World Aerobatic Championships

At the 2003 World Aerobatic Championships, held in Lakeland, Florida, Russian pilot Sergey Rakhmanin won the Aresti Cup as the top aerobatics pilot in the world, taking the men's and overall gold medals at the championships. It is his first world championship. Finishing second was Russian Alexander Krotov. Robert Armstrong of the United States was third.

In the team contest, the Russian men came in first place, edging out the team from France. The U.S. men captured the bronze.

Svetlana Kapanina of Russia again dispayed her dominance, capturing the woman's gold and coming close to edging out Rakhmanin for the top spot overall, finishing a tight second after leading late in the competition. Kapanina has won the women's gold at four of the last five world contests.

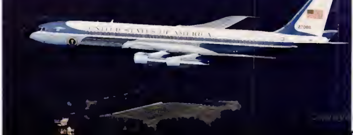
In the men's standings, Americans David Martin and Kirby Chambliss finished in eighth and ninth place, respectively. Debby Rihn-Harvey placed highest among American women, taking fifth.

Van's Flies RV-10

In late May Van's Aircraft made the first flight of the company's newest design, the RV-10. It's the sixth numbered model in the kitmaker's lineup, but it has generated a lot of excitement since the program was announced last year because it's the first four-seater from the company, which has turned out thousands of kits for two-seaters. Van's plans to offer tail kits to builders soon. With the recommended Lycoming IO-540 powerplant, Van's projects that the RV-10 will cruise at more than 170 knots and carry four 175 pound adults and full fuel (60 gallons), along with 40 pounds of bags. For more information, visit www.vansaircraft.com.

Air Force One Retires to Reagan Library

The Boeing 707 that served as an Air Force One aircraft for 28 years is on its way to the Ronald Reagan Presidential Library in Simi Valley, California. The airplane was disassembled at San Bernardino International Airport (California) and transported to Simi Valley, where it will be reassembled, restored and put on public display beginning in late 2004. Reagan flew on the airplane extensively during his eight years as chief executive. The four-engined Boeing also transported Presidents Nixon, Ford, Carter and Clinton, and both Presidents Bush. The airplane made its last flight as Air Force One in August of 2001 when it transported President Bush to San Antonio for a public appearance. It was the 707's 444th mission as Air Force One. The Boeing Company dismantled the airplane and will be in charge of restoring it for the Reagan Library.



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Olympia, Washington-based Soloy Corporation earned FAA certification for its Turbine Pac-powered modification of the Cessna 206H and T206H. The Turbine Pac uses a 420-horsepower Allison 250 turboshaft and a Soloy-manufactured propeller reduction gearbox. A Soloy designed engine/gearbox frame protects against foreign object damage and helps reduce external noise. The Soloy modification, which has a maximum gross weight of 3,600 pounds, is available with wheels or floats.

New Taxiway Layout Tested

Virtual-reality tests of perimeter taxiways at DFW International Airport in Dallas, Texas, were deemed successful. The tests, conducted by NASA Ames FutureFlight Central, virtual-reality control tower, the FAA William J. Hughes Technical Center, and pilots and air traffic controllers who fly out of and work at DFW, demonstrated that perimeter taxiways reduce radio communications and allow aircraft to taxi around runways rather than having to cross them. As a result of the virtual-reality tests, perimeter taxiways may be constructed at DFW, the country's third busiest airport, in the next several years.

Seawind to Build Canadian Plant

Seawind, which is seeking FAA and Transport Canada certification for a new version of its high-performance composite amphibian, will build the airplanes at a new 80,000 square-foot production factory in St. Jean sur Richelieu, Quebec, Canada, just north of the New York border. Seawind expects the certification program to cost $16 million (U.S.). It hopes to earn certification by the ambitious target date of July 2004. Cost of the airplane is $289,700 for a VFR-equipped model and $328,300 for a model approved for IFR and outfitted with a UPS Aviation Technologies avionics stack.

The Seawind has been around as a homebuilt kit for about a decade, with 160 kits having been sold in that time. The company estimates that around 60 of its airplanes are flying. While Seawind will phase out kit sales as it introduces the certified airplane, it will continue to support existing Seawind kit aircraft with technical support and parts.

The Seawind 300C will boast many of the features of the kitplane, including 160-knot-plus cruise speeds and room for four adults and their bags. Additionally, the certified version will feature several design improvements, including trailing link main landing gear that when retracted is stowed entirely in the wing, more room in back for the passengers, increased storage area in the nose and in the rear, new hull geometry for better water handling, and lighter empty weight for better useful load. The company hasn't finalized its powerplant choice but is leaning toward the 300-hp Lycoming IO-540.

New Dassault Hangar

Dassault Falcon Jet broke ground on June 5, 2003, for a new flight operations hangar. The new 32,200-square-foot complex being built on the east side of Teterboro (New Jersey) Airport directly across from the company's headquarters will house the flight operations department and the Falcon demonstration fleet. In addition to consolidating the flight operations personnel with the marketing team, the new complex will make customer and prospect visits more convenient. The hangar (22,500 square feet) will be capable of holding up to six Falcons, including the Falcon 7X.

Frank Robinson landed a Robinson R44 Raven II on the first approved and permitted Robinson Helipad. The 20- by 20-foot helipad, located on the Honda dealership in Santa Ana, California, features a company-designed lightweight deck capable of accommodating helicopters with gross weights of up to 3,000 pounds. The deck is composed of 24 ten-inch-wide by 20-foot-long aluminum extrusions that fit together in a tongue and groove configuration. Robinson is offering a free helipad deck, consulting and engineering services to any customers in Southern California or Arizona who purchase a new R44.

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A Fractional Cub

Indiana-based Time Pieces, a company that sells shares in the Piper J-3 Cub, is offering a new spin on fractional ownership of owner-flown general aviation airplanes. The program is structured differently than traditional fractional programs, charging a one-time, fixed rate and debiting the monthly management fee for the term of the agreement; at the end of the contract period, the aircraft has no residual value to the shareholder. The company will sell 10 shares of the aircraft, retaining one share of its own. The ownership fee, $3,750, entitles the shareholder to 50 hours in the Cub as well as his name on the registration for the duration of the 24-month contract. The company reports a strong interest in the program and expected to sell 10 shares by the end of May. For more information, visit www.IFlyTimePieces.com.

Wheelchair Aviators

In 1972, four paraplegic aviators from Southern California began meeting once a month to fly to lunch. From those social flights arose the International Wheelchair Aviators (IWA), a worldwide organization of disabled and able-bodied pilots devoted to helping pilots with physical disabilities either begin flying for the first time or resume flying after being grounded.

One of the questions most frequently asked of the organization is "Can a paraplegic, amputee or person with a leg handicap fly?" The answer is yes, a person in normal health who can compensate with quick reflexes or an alternate method of control can probably fly. The organization includes pilots with paraplegia, quadriplegia, multiple sclerosis, spina bifida and polio, all of whom operate as pilot in command of the aircraft that they fly.

The organization is committed to showing children and young adults the joys of flying. Some of the IWA pilots are active with Challenge Air (www.challengeair.com), a nonprofit organization whose mission is to offer "motivational, inspirational and life-changing experiences to physically challenged children and youth through aviation." Challenge Air provides flights in small airplanes for physically and mentally challenged children as well as those with serious illnesses. The purpose of these flights, flown by both wheelchair and non-wheelchair aviators, is to inspire children that their dreams and goals are possible.

The group is also a resource for disabled pilots who want to get in the air, providing information about FAA medical requirements, flight schools that work with the disabled, and the availability of suitable hand controls. In addition, members of the organization are available to offer advice; IWA publishes for its members a roster that includes over 200 disabled pilots, the type of airplane that they fly and their contact information so that new pilots can benefit from the experience of pilots in similar situations.

For more information about the International Wheelchair Aviators, check out www.wheelchairaviators.org or call 909/585-9663. *—By Annmarie Yannaco*

Canada's National Research Council is working to develop automatic control and landing systems for helicopters to assist pilots with the high-workload landing phase of flight, particularly in IFR conditions. The organization's VALET project, for Vertical Auto-Land Experimental Technologies, allows the pilot to give control of the helicopter to an onboard, automated control system that uses GPS position and aircraft data to transition the helicopter from forward to vertical flight and then complete the landing phase.

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Aircraft Spruce & Specialty has purchased the rights to offer plans and materials packages, including pre-made components, for the Stolp Starduster line of homebuilts. The lineup includes the Starduster Too, the Acro-Duster Too, the Starlet, V-Star, Super Starduster and Starduster One. Aircraft Spruce said that more than 300 Stardusters have been completed and flown.

JetBlue Airways ordered 100 Embraer 190 regional jets. The ERJs join the Airbus A320 in JetBlue's fleet. The EMB 190s operated by JetBlue will be configured with 100 seats in an all-coach two-by-two arrangement. The deal has been valued at approximately $3 billion.

Raytheon hired its first customer service representative for China. Haiming Shen will support China's customers who have orders for Premier I and Hawker Horizon aircraft. He will also help support Raytheon's existing corporate, airline and government customers, all of whom operate Hawker 800s and King Air turboprops.

Jeppesen has integrated its subsidiary ASAC into its Government and Military Services unit. ASAC aids customers in designing and developing flight procedures, as well as analyzing airspace. Recent projects include several RNAV approaches in the Caribbean, special-use approach procedures at Aspen and required navigation performance (RNP) approaches in Tibet.

Orlando's Executive Air Center at Orlando Executive Airport (ORL) has added five acres of ramp space at its recently completed new facility. The additional space, capable of accommodating as many as 15 Gulfstream GIVs, marks an eight-fold increase in the FBO's ramp. The FBO is an authorized Cessna Service Center and an Avfuel dealer.

The EAA Sport Pilot/Light Sport Aircraft Media Guide is available on compact disc. The guide explains the basics of the SP/LSA rule, including information on the new Driver's License Medical Plan and what types of aircraft a sport pilot can fly once the FAA approves the rule (perhaps by now). The guide can be downloaded off the SP/LSA website at www.sportpilot.org.

The FAA has changed its policy regarding airline pilots who fail a Breathalyzer test while on duty. In the past the FAA lifted pilots' medical certificates when they failed sobriety tests. Since January, the FAA is also revoking pilots' airman certificates. To reinstate their medical and airman certificates pilots have to wait a year and, in the case of their airman certificates, retake all the written and flight tests.

Jeppesen partnered with Flyware to offer eLoadsheet, a web-based weight and balance calculation tool for a number of different aircraft types. The user enters values for fuel, cargo, passengers and crew, and eLoadsheet generates a loadsheet, load plans and loading instructions. The calculation tool is available at www.jeppesen.com.

In June, Jet Aviation Bedford installed its first reduced vertical separation minimums (RVSM) modification in a Beechjet 400A. RVSM airspace goes into effect 2004, and operators who want to fly at RVSM altitudes must ensure their airplanes are RVSM compliant by then.

NetJets is offering a new service, Mayo Clinic Executive Travel Response, to shareowners in its fractionally owned aircraft program. The program provides owners with access to medical support from the Mayo Clinic while they are on their aircraft; in a medical emergency, flight crews contact the Clinic's emergency physicians and nurses for information about treatment and possible flight diversion recommendations.

Diamond Aircraft sold six DA20-C1 Eclipse aircraft to Moncton Flight College's flight training program. The aircraft are scheduled for delivery to the New Brunswick school prior to the start of the fall semester. Both Diamond Aircraft and Moncton Flight College look forward to a long-term partnership focused on expanding the quality of flight training.

Pratt & Whitney Canada is celebrating 75 years of powering flight. Originally founded in 1928, in Longueuil, Quebec, to repair and overhaul Pratt & Whitney WASP radial piston engines, P&W Canada now manufactures and services turboprop, turbofan and turboshaft engines in a wide range of power ratings.

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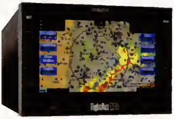

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1992 Socata TBM 700

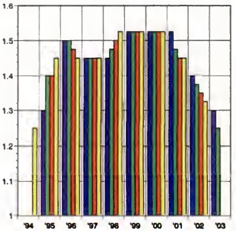
The TBM 700 is doing a better job of holding onto its value than almost any other turboprop. Fletcher Aldredge, editor of *Vref*, a leading used aircraft value reference, reports that a 1992 TBM is currently selling for about $1.25 million, which equals approximately 86 percent of its average new price of $1.45 million.

Aldredge reports that a 1992 Beech King Air 200 currently sells for about 51 percent of its new price; a Citation II from the same year is worth about 68 percent of new; a Falcon 50 is at 67 percent of new; and a Learjet 35 is selling at about 61 percent of new. The TBM 700 looks like the strongest performer in the group.

But the fast, single-engine TBM 700 turboprop isn't immune to the downturn that has roiled the category. Just over two years ago the same 1992 model was bringing an average price of $1.525 million, well above its original selling price.

The TBM 700 that *Vref* is valuing here has the original Bendix/King avionics, 1,500 hours since major overhaul of the PT6A turboprop engine and like-new paint and interior. TBO on the engine is 3,000 hours, and *Vref* estimates an average overhaul price to be $150,000. Socata built 45 TBMs in 1992.

For information on how to subscribe to *Vref*, call 913/879-2300, or check out www.vrefpub.com.



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Cromwell, Connecticut, resident Joe Gauthier won the 2003 Tony Bingelis Award from the EAA. The award recognizes his contributions to the homebuilt community, his promotion of safety and his maintaining the values of the EAA. Gauthier, active as an EAA Technical Counselor since 1977, is also a certified FAA Safety Counselor and NAFI Master Flight Instructor.

The Boeing 777-300ER, the newest jet in the 777 family, took off at 774,600 pounds, the heaviest takeoff weight ever for a twin-engine airplane. The 777-300ER is powered by the General Electric GE90-115B. The takeoff took place May 20th during FAA certification flight testing at Edwards Air Force Base.

Jet Aviation Group now offers Hush Kit installations for Gulfstream operators. The company's maintenance facilities in Geneva, Singapore, Teterboro and West Palm Beach were appointed service centers in May for the installation of Quiet Technology Aerospace's (QTA) Hush Kits in Gulfstream GII, GIIB and GIII aircraft.

Bombardier's Flexjet shared-ownership program now offers owners the opportunity to exchange hours. Owners who don't use all of their hours can place as many as 25 percent of their annual allocated hours into a pool.

At the 2003 Paris Air Show, Jeppesen and Goodrich Corporation announced that they are integrating Jeppesen's Electronic Flight Bag (EFB) applications with Goodrich's Video Surveillance Systems (VSS), which will eliminate the need for a stand-alone video surveillance display in the cockpit. The Jeppesen EFB allows flight crews access to electronic navigation charts, aircraft performance calculations, taxi position awareness, electronic document management, video surveillance and more.

Westchester County Airport (New York)-based Panorama Flight Service has signed an agreement with Chevron/Texaco to provide aviation fuel at Panorama's brand new facility on the west side of the airport. For more information, visit www.flypfs.com.

The Bombardier Challenger 300 received full type certification from both Transport Canada and the FAA in May and June, respectively. The new super-midsize jet, the first of its type, will enter corporate service this year.

British Airways announced that the Concorde will make its final commercial flight on October 24th, ending 34 years of supersonic aviation history. The passenger jet will leave JFK Airport in New York at 7 a.m. and touch down for the final time mid-afternoon in London. Air France removed its Concorde fleet from service on May 31st.

Bombardier cut an additional 90 aircraft finishing employees in the Montreal-based airplane manufacturer's Tucson operation in June as part of the company's layoffs that began in January 2002.

Boeing's proposed new 7E7 jet will be the first commercial airplane whose wings and fuselage will be made of primarily sophisticated plastics, instead of aluminum. The main composite material for the 7E7 will be graphite combined with an epoxy resin; the wings will include a combination of titanium metal and graphite composites. The use of composites, says Boeing, will cut down on maintenance and assembly time.

Aviation enthusiasts plan to display a U.S. Starfighter Air Force F-104 fighter jet at Nevada County Airport (California) to honor Chuck Yeager, who test flew the same model 40 years ago. The Air Force has since retired the F-104, a single-seat, single-engine craft that has a 22-foot wingspan. Yeager became famous when he flew faster than the speed of sound in a Bell X-1 in 1947.

Russian aircraft maker Sukhoi and Boeing are working together to manufacture the prospective Russian Regional Jet or RRJ airliner for both the Russian and foreign markets. Three models will be designed to accommodate a specific number of passengers: RRJ 60, RRJ 75 and the RRJ 95. The RRJ is set to make its first flight in January 2006 and to enter service in 2007.

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Sky Ark

Nonprofit group Sky Ark is looking for volunteer pilots. Based in Buena Vista, Colorado, Sky Ark provides free of charge air transportation for animals in need of medical assistance or other services.

The organization flew its first mission earlier this year in its Geronimo-conversion Piper Apache, transporting a pair of miniature pinschers from a shelter in Newton, Kansas, to their adoptive homes in Boulder, Colorado. The next mission transported a Harris Hawk from St. Louis to the Hawk Creek Sanctuary in New York. Animals transported on Sky Ark aircraft must be certified to be in good enough medical condition to make the flight, as pilots are not trained in veterinary medicine and Sky Ark is not an ambulance service.

The demand for the Sky Ark's services has been great. Since it started providing animal transport, the organization has received as many as 50 calls a day. To volunteer or to get more information, visit www.skyark.org.

Most Expensive Ticket, Ever

Space Adventures, the company that was instrumental in arranging the space flights for Dennis Tito in 2001 and Mark Shuttleworth in 2002, through a partnership with the Russian Aviation & Space Agency (RASA) and RSC Energia, is offering flights for two "explorers" to the International Space Station (ISS) aboard a Soyuz TMA spacecraft. After training at Star City, outside Moscow, familiarizing themselves with the Soyuz TMA spacecraft, experiencing weightlessness and learning how to function aboard the ISS, the two will lift off in early 2005 from the Baikonur Cosmodrome in Kazakhstan. Price of the round trip is $20 million.

datalink

A financial recapitalization agreement with Raytheon Travel Air and other investors has resulted in Raytheon owning an approximately 65-percent interest in Flight Options. As part of the agreement, Raytheon has committed to invest additional capitol on an as-needed basis over the next 18 months and to provide secured aircraft and retail financing over the next three years.

In early June, Philadelphia International Airport became the first airport in the United States to fully deploy STARS, Standard Terminal Automation Replacement System. STARS, at an estimated cost of $1.69 billion, will be capable of managing thousands of flights simultaneously; the old system managed 300 flights at a time. STARS will be deployed in 167 airports over the next eight years if Congress approves increased funding for it.

Russell G. Chew started his new job as the first chief operating officer for the FAA on August 1st. Chew will oversee the operational and financial performance of the ATC system, research and acquisition programs and work to create a more businesslike structure for the FAA that adheres to strict performance measures. Previously, Chew directed day-to-day operations at American Airlines control center. It took the FAA more than two years to fill the past.

Eclipse Aviation laid off 12 factory workers in June. The layoffs were due to company restructuring efforts supporting a redesign of the Eclipse 500. Though manpower has shrunk in the manufacturing area, the company plans to hire at least 12 engineers to execute the redesign.

EADS Socata named Stéphane Mayer as the company's president and CEO. Mayer succeeds Philippe Debrun.

Liberty Aerospace completed the spin test program for its XL-2 two-place touring aircraft currently undergoing FAA certification. The company said that it completed more than 150 spins as part of the testing. Liberty expected to have FAA certification for the XL-2 by the time you read this.

Charter provider TAG Aviation implemented sweeping new security procedures as part of the TSA's program for aircraft weighing more than 12,500 pounds. TAG's security measures call for fingerprinting of all flight deck crew, 24-hour advance notice of passengers and the requirement that all passengers have government issued ID.

Boeing and U.S. Navy engineers have developed new flight control software for the F/A-18 that makes the fighter/attack aircraft far more resistant to loss of control. Boeing made the upgrade after studying several instances when Hornets departed controlled flight into a falling-leaf stall after maneuvering at slow speeds at a high angle of attack. The software helps eliminate the phenomenon.

Small-airplane fractional provider OurPlane has added two new aircraft to its fleet: a Cirrus SR22 at John Wayne International (the fifth there) and a Cessna 182T at Toronto's Brampton Airport (the fifth airplane there, too). **OurPlane also opened a new base of operations at Houston's Hooks Airport,** where the company will offer shares in Cirrus aircraft.

Charter and membership provider Avbase Aviation opened a new operations headquarters at Addison, Texas' Mercury Air Center. Avbase will conduct market charter flights out of the new base and conduct maintenance and other operations as well.

NASA's *Helios*, a multimillion dollar unpiloted prototype solar-electric flying wing, crashed into the Pacific Ocean off Hawaii during a flight test. NASA was testing new power options for the 247-foot wingspan *Helios*, which set an altitude record for winged aircraft of 96,863 feet in 2001.

Executive Jet Management (EJM) had the best charter sales month in its nearly 40-year history in March. The company also reported an 11 percent increase in charter sales during the first quarter of 2003, compared to the same period in 2002. EJM manages more than a 100 aircraft in over 50 locations throughout the country. ☐

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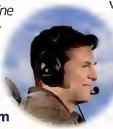

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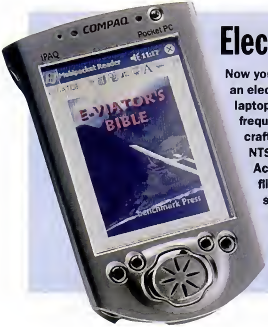
New Products

Edited by Elizabeth J. Murray

Airshow Armchair

The Backpack Beach Chair, distributed by The Proper Aircraft Company, is a portable seat to carry to an airshow, to the hangar or to the beach. The chair can be worn like a knapsack, weighs seven pounds and folds to 5"x 7"x 29". Assembly takes about a minute; once completed, grab a cool drink, drop it into the cup holder and have a seat. The chair will support up to 250 pounds and is made from breathable Textilene mesh that prevents fraying. A mesh storage area beneath the seat holds extra stuff, and a small foam pillow serves as a headrest. The seat is most comfortable if you are 5'8" and under; the back of the chair does not extend high enough to adequately support the neck and head of anyone over 5'10". The $39.95 chair is a comfy alternative to the ground. To order, call The Proper Aircraft at 800/530-8404 [item #4-170701] or visit www.TheProperAircraft.com.



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Buck Metro Titanium Knife

LEN LAGRUA

Buck Knives aren't just for hunting. The Metro, pictured here, is a compact-blade version of Buck's trademark super sharp knife and can be used every day. The oval-shaped titanium knife has multiple functions: a knife, a key chain, bottle opener, soda can top opener or even a self-defense deterrent, like brass knuckles. The knife is signature Buck: the blade is made from high carbon stainless steel for corrosion resistance, strength and hardness. It can also serve dual purposes; when used as a key chain, it was easy to locate in a bag. The ridged teeth came in handy to jimmy stuff open, and the small blade cut through everything with precision. Opening and closing the Metro can be done with one hand by using the locking liner blade. The anodized aluminum sides, with strong riveted construction, come in five colors: blue, purple, green, orange and black. To order the $21 Metro knife [B759 Metro], visit www.buckknives.com or write Buck Knives, Customer Service Department, P.O. Box 1267, El Cajon, CA 92022. ☐

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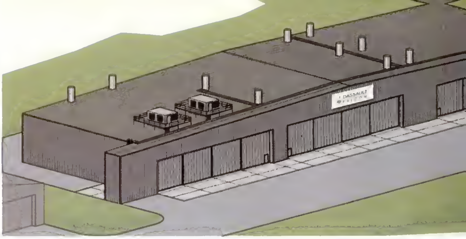
By Tom Benenson

Dassault Falcon Jet Breaks Ground on Paint Hangar



On May 28th, Dassault Falcon Jet held a ceremonial groundbreaking for its new paint hangar at its Little Rock, Arkansas, completion facility. The paint hangar, which is expected to be completed by February 2004, will consist of three individual bays measuring 102 feet by 102 feet each, plus attached office and storage space and will add 46,000 square feet to the existing paint capacity. More important, it will make room for the Falcon 7X, which will have a wingspan of more than 82 feet, compared to that of the 900EX, which is slightly more than 63 feet. The Little Rock facility, with more than half a million square feet (making it even larger than Dassault's assembly plant at Bordeaux-Mérignac, France), completed nearly 50 new Falcon jets in 2002. Although delivery rates will fall this year, the paint facility is expected to be even busier because of the backlog and growing requirement for refurbishment work.

Flight Timer Makes the Most of Time

A chronometer that marks the passage of time for just about everything a pilot needs to know is now available from Aviation Supplies & Academics. The ASA Flight Timer features a multifunction clock that offers a.m./p.m., Universal Coordinated "Zulu" time and military time options. In addition to three simultaneous timer functions, count-up and count-down and elapsed trip timers with audible and visual alarm modes, the Flight Timer features a digital notepad to jot down information such as squawk codes and frequencies. The timer has a large LCD backlit display and a push and rotate dial for inputting data. Users can store up to 12 different approach times. The Flight Timer is priced at $49.95 from ASA. For more information or a catalog, call 800/426-8338 or 425/235-1500; www.asa2fly.com/catalog.htm.

DUAL ROTOR VACUUM PUMP GETS STC AND PMA

Aero Advantage has earned an STC and a PMA (parts manufacturing approval) for its dual rotor vacuum pump. The system has two pump chambers that can operate independently of each other so that if one fails the other can continue to function and provide nominal pump performance to continue to power the aircraft's directional gyro and attitude indicator. A vacuum pump monitoring system provides cockpit indicator lights to advise the pilot of the operation status of both pump chambers. If a problem occurs with one of the chambers, the appropriate indicator light will illuminate. The Dual Rotor Vacuum Pump and Monitoring System is $795. For more information, call 817/326-6147; www.aeroadvantage.com.

Company Restores Cessna Wings and Flight Controls

Shearer Aviation Specialties, located in Casper, Wyoming, has invested in tools and equipment so it can now restore wings and flight controls for the Cessna 180, 182 and 185 as well as cowlings and flight controls for the de Havilland Beaver. Tools include a 24-inch compression riveter, four pneumatic rivet squeezers of different shapes and sizes and all the fixtures and tools for every job. The company says it doesn't patch things up, it puts them back to original condition. "If it isn't pretty, it is not airworthy." If a skin is bad, for example, the whole skin is changed. If a spar is bad, the whole spar is changed. The paperwork is kept simple and the value of the airplane is maintained. For more information, call 307/266-1448; www.wingrebuilder.com. ☐

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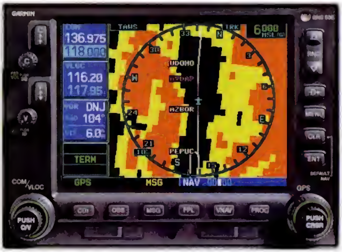
Avionics

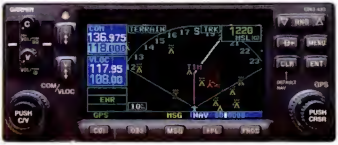
Edited by Robert Goyer

Major Upgrades Coming for Garmin 430, 530 Navigators

Owners of Garmin 400- and 500-series navigators will soon have more internal options for their already extensively integrated boxes. Garmin will offer a trio of pay-for upgrades for the two navigators starting later this year. Some of the enhancements will be field-installable; others will require the owners to send the units back to Garmin for the upgrade (while using a loaner unit while theirs is being worked on).

Terrain advisories will be first in line. Garmin plans to offer those toward the end of this year. The terrain advisory upgrade is a software change, for which owners will pay a fee of $500. Like other advisory-only utilities integrated into multifunction displays, the Garmin terrain feature will display nearby terrain in yellow or red so pilots can maintain better terrain awareness to anticipate and avoid premature reunions with Mother Earth.





A second terrain option is for operators of 500-series units who need to (or want to) upgrade to certified terrain avoidance and warning system (TAWS). Garmin's integrated TAWS is a Class-B device that will satisfy an upcoming FAA requirement for turbine-powered aircraft of six passenger seats or more to be outfitted with an approved TAWS. Cost of the certified TAWS option is $6,495 if ordered by the end of the year; TAWS upgrades will be done at the Garmin overhaul facilities in Olathe, Kansas, or Romsey, United Kingdom.

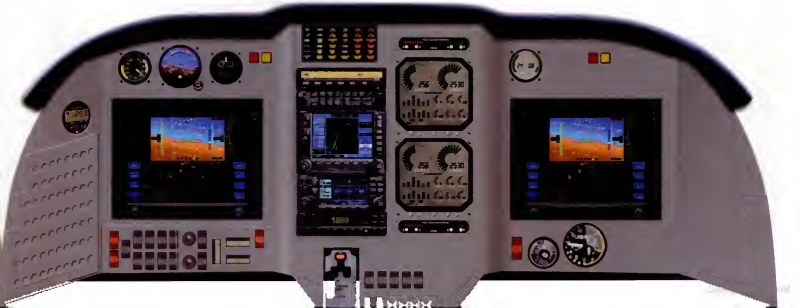
Finally, with WAAS procedures around the corner, Garmin has announced that it will offer WAAS upgrades for both its 400- and 500-series navigators. As with the TAWS upgrade, the WAAS enhancement will be done at Garmin's U.S. and U.K. facilities. Cost of the upgrade is $1,500.

For more information, visit www.garmin.com.

Adam Selects Avidyne Entegra Avionics for A500

Adam Aircraft has selected the Avidyne Entegra integrated avionics system for its A500 centerline-thrust piston twin, which the company expects to have certified this year. Adam will certify the airplane with electromechanical avionics before going to flat-panel displays to preclude potential certification delays. But the early certification of Entegra in the Cirrus SR22, among other aircraft, makes Adam confident that it will introduce flat panels early in the A500 program.

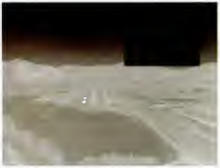
The A500 panel initially will feature a pair of 10.4-inch diagonal primary flight displays but no center-mounted multifunction display. Instead, Garmin avionics, including a GNS 530 navigator, will take up the center stack. Analog standby flight instruments will be mounted above the left-seat flat-panel display. Adam does plan to introduce a third, center-mounted flat-panel display later. To learn more, visit www.adamaircraft.com.



Primus Epic Gets First Certification

Honeywell recently announced that its Primus Epic integrated avionics system, long under development, has gotten its first certification, as part of the Bell/Agusta AB139 helicopter. The certification is the first of many to come. Primus Epic has been selected as the standard avionics system on the Hawker Horizon, Cessna Sovereign, Gulfstream G550, Dassault Falcon 900EX, 2000EX and Falcon 7X, and the Embraer 170/190 regional jets.

Max-Viz Flying 10 Least Favorite Approaches



■ **A camera captures the EVS view of a dark night approach at Sun Valley, Idaho**

To demonstrate the safety benefits of its Enhanced Vision System (EVS), Max-Viz is flying approaches around the United States that offer the most challenges, especially at night and in demanding weather conditions. The first flight was into Sun Valley, Idaho, (KSUN) at night. While the RNAV (GPS) Rwy 31 approach is "not recommended for night use or in marginal weather by unfamiliar pilots due to mountainous terrain," Max-Viz pilot Roger Watson, flying the company's Cessna 421, reported that the enhanced vision system showed the terrain in "striking detail."

The Max-Viz EVS shows a view of the outside world that cuts through darkness, smog, smoke and haze. The real-time image can be displayed on a variety of video-capable multifunction displays, allowing the pilots to monitor the safety of the approach.

To learn more about EVS—and to see streaming video of enhanced vision on approach—visit www.max-viz.com. ☐

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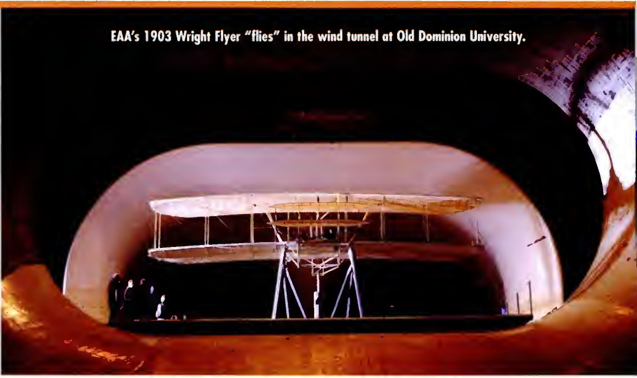

EAA's 1903 Wright Flyer "flies" in the wind tunnel at Old Dominion University.

EAA's 1903 Wright Flyer will be showcased in the Countdown to Kitty Hawk pavilion.

Built with the utmost care and precision, EAA's 1903 Wright Flyer reproduction will recreate history at exactly 10:35 a.m. on December 17, 2003 when it takes to the skies above the sands at Kitty Hawk, N.C., as part of the nation's First Flight Centennial Celebration. The 605-pound flyer, is an exact reproduction of the historic original, featuring ash struts, hand-carved spruce propellers, "Pride of the West" muslin, and steel wires and bracing. Wind tunnel testing at Old Dominion University confirmed its 180-pound 4-cylinder aluminum engine generates 14 horsepower, and that it can be controlled to the same extent that Wilbur and Orville Wright were able to maneuver their first aircraft 100 years ago.

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By Jay Hopkins

Listen to the Warnings

As I was reading through NTSB reports recently, I was struck by the number of accidents in which someone had tried to warn the pilot of the hazards of making or continuing the flight. Obviously these were not situations that had somehow snuck up on the pilot but involved conditions so bad that someone felt it was important to speak to the pilot and try to dissuade him from departing or continuing on the flight.

The most likely source of a warning is a flight service briefer. After all, it is the briefer's job to inform the pilot of the weather and other conditions that might affect the flight. However, the mandatory warnings of low ceilings, icing and obscured mountain tops are so common and often so far off track that they are the equivalent of crying wolf over and over. In any case, the briefer can only advise the pilot—the final decision always rests with the pilot.

In the cases I was reading, the weather was so bad that the warning of the FSS briefer should have opened the pilot's eyes to the risks he was facing. One pilot received two separate warnings from weather briefers. The non-instrument-rated private pilot had flown his wife and son in a PA-32-300 from Iowa to Durango, Colorado, and they were trying to return to Iowa three days later. When the pilot called for a briefing the night before the return trip, the briefer warned that "VFR flight was not recommended," with airmets for mountain obscuration and moderate and even severe turbulence below 16,000 feet, along with occasional moderate rime or mixed icing from 10,000 to 24,000 feet. The forecast for the following morning wasn't much better, with a cold front anticipated to move into Colorado, causing IFR conditions all along eastern Colorado and Nebraska.

The NTSB report states that the pilot called the Denver AFSS at 6:00 the next morning and was again told that VFR flight was not recommended. The frontal system was moving through the state, and in addition to the airmets for mountain obscuration, turbulence and icing, there was a chance of thunderstorms over western Kansas and Nebraska. No one saw the pilot and his family depart that morning. Two days later, the airplane was reported overdue by family members when they did not arrive home as planned. The airplane was located 10 days later on the east side of a mountain at about 11,500 feet. The NTSB investigators interviewed area residents, who reported that low clouds accompanied by periodic snowshowers obscured the mountain peaks throughout the day of the accident. The cloud tops were between 14,000 and 15,000 feet, and the NTSB determined that the density altitude at the accident site had been over 13,000 feet.

It is likely that this pilot, who lived in Iowa, had little, if any, mountain flying experience. Yet he ignored two warnings from FSS weather briefers that VFR flight was not recommended, backed up by weather conditions that were clearly hazardous for his experience and type of aircraft. He and his family died as a result.

Another pilot received several warnings from a flight instructor before departing. The NTSB report states that the instructor discussed the current weather conditions with the pilot and asked if he was instrument rated. The accident pilot replied that "he was not instrument rated but that he just needed to take the check ride." The instructor then helped the pilot check the weather conditions and

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stated that the pilot was well aware of the local weather, which was being reported as three quarters of a mile visibility with mist, ceiling 300 feet overcast with a temperature of –3° C and a dew point of –4° C. There were airmets for IFR and icing conditions continuing through the afternoon. The instructor stated he then told the pilot "he could not legally file a flight plan or fly in these conditions."

After the pilot taxied the Bellanca Super Viking from the ramp, the instructor made repeated calls over the unicom frequency but received no reply. When the pilot made a call that he was about to depart, the instructor made one last call, advising the pilot "to be aware of freezing fog and sleet that was falling at the time and wishing them a safe trip." Approximately five minutes after the airplane took off, the instructor heard "heavy breathing and cussing" over the unicom frequency. He looked out the window and saw the aircraft descend out of the clouds over the hangars across the runway. The pilot banked hard to the left to avoid a building and then crashed in an open field, killing himself and his passenger. The NTSB determined that the pilot had received his private pilot certificate less than a year before the accident. His total flight time was just over 240 hours, and while he did have complex and high-performance aircraft endorsements, he had not received any instrument training beyond the 3.6 hours accumulated during the course of his training for the private pilot certificate.

In a very unusual situation, an individual who had been issued his student pilot certificate just three weeks prior to the flight took off in a PA-18. He had only flown the aircraft twice since receiving his student pilot certificate for a total of 1.5 hours and had not received a solo cross-country endorsement. His passenger in the back seat had been issued a private pilot certificate 10 years earlier but had not flown for the past eight years and did not have a current medical or biennial flight review.

The two departed Sandy, Oregon, late in the morning and flew first to Raymond, Oregon, then to Bend, Oregon, and finally arrived in Madras, Oregon, at about 2 p.m. They planned to have lunch with family members in Madras but elected not to stay because the wind was becoming strong out of the west and clouds were starting to back up against the west side of Mount Hood. Because of the worsening weather, a family member offered to drive the student pilot and his passenger back to Sandy, but they declined the offer and elected to depart immediately so they could get back to Sandy before the bad weather hit there. According to the passenger, about 30 miles southeast of Sandy they encountered a "well defined and distinct wall of clouds, mist and rain." As the aircraft entered the weather and the visibility became "severely restricted," the passenger asked the student pilot to turn around and go back to Madras. However, the student pilot replied that he didn't want to leave the airplane at Madras and that he could use his handheld GPS to find the airport at Sandy.

The passenger could not see the ground and assumed the pilot was using a turn and bank indicator to control the aircraft in the clouds. However, the NTSB determined after the accident that the aircraft was not equipped with even that basic instrument. As they got within five miles of the airport they encountered heavy rain, strong winds and very strong up- and downdrafts. When the GPS indicated they were over the airport, the student pilot descended below the clouds so they could attempt to find the airport. As they searched for the airport, they continued to experience strong, gusty winds, turbulence, rain and very low ceilings. When the student pilot spotted a clearing in the woods, he announced he was going to land there. However, on short final to the clearing, they struck the top of a tree and crashed, killing the student pilot.

These accidents cover a broad spectrum of pilots; one appeared to be trying to do things right by getting a weather briefing, one lied about his experience and another had little or no respect for the regulations. Each pilot was obviously locked into trying to get to his destination, and in each case one or more individuals tried to warn the pilot about the risks of proceeding as planned.

If someone is warning you not to proceed, carefully consider the warning. It is very possible that a warning from someone else may be the wakeup call you need, that you are locked in a mental state of "get-there-itis," that is leading you to take unnecessary risks you may not be able to overcome or recover from. That warning may be the last chance you get to step back from the brink of disaster. □

By Richard L. Collins

Dave Hock and his Tiger

DAVE HOCK, 43, IS A CLIENT MANager for a major computer company and has been flying for seven years. He has owned his Grumman American AA-5B Tiger for six and a half years and has a private certificate and an instrument rating.

Dave's Tiger is based at the Hayward, California, Airport, which is just across the bay from San Francisco International. Hayward is a busy general aviation airport with, he says, "good facilities and a great tower." The airport has parallel runways. It has multiple instrument approaches, including VOR/DME, GPS and localizer. IFR departures can be held up because of the steady stream of Southwest jets going into Oakland, just a few miles to the northwest.

Dave has flown 585 hours, including 17 actual instrument, 63 simulated instrument, 55 night and 350 cross-country. He enjoys flying at night, and more than half his training for the instrument rating was done at night, in the winter months. He will fly up to about 10 p.m.

He uses the Tiger strictly for personal flying with trips averaging one to two hours in length. In the past year he has ranged out to Denver, Colorado; Sedona, Arizona; Bend, Oregon, and San Diego. His longest trip ever was in 2000 to Oshkosh. The return was made in one day, "with some good weather and a slight tailwind, what a blast!"

Dave does a lot of day trips with his wife, Leslie, and sons, Christopher and Kevin, flying to the mountains or the beach. There are also $100 hamburger runs, air tours of the area for family and friends and local practice flights for proficiency and fun.

In the past year Dave has had an instrument proficiency check, which by rule embodies most of what is on the check ride for the initial issuance of an instrument rating. This was not required by his insurance company.

The most hours Dave has flown in a 12-month period is 140. He is currently flying about 90 hours a year. In the past year he has flown about three hours of actual instruments, some en route and some climbing or descending through the stratus layer that is common to the area in which he bases. He hasn't flown any low-weather approaches in the past year and his experience in that area is limited to a few ILS approaches with an instructor on board.

His Tiger has a Garmin VFR GPS/comm, a Narco navcom with glideslope and a Narco nav. There's a Century I autopilot that is basically a wing-leveler with nav tracking capabilities through the VFR GPS and the VOR/localizer systems in the airplane. The autopilot had apparently been giving him trouble, and Dave says he is using it about 25 percent of the time now that it is working correctly. He adds that he wished it had been

Flying Check Ride Checklist: Dave Hock Grumman American Tiger

Experience .... Good seven years, 585 hours

Annual Use .... Probably close to average for a Tiger owner, about 90 hours a year

Recurrent Training .... Okay, but if he steps up as per his wishlist, there'll need to be more.

Equipment: .... The avionics are probably average for the airplane and, well, everyone at least thinks about being above average. Needs a handheld GPS and receiver.

Maintenance .... He's into this and appears to take good care of his Tiger.

Wishlist: .... A new Cirrus SR22 or a used Bonanza

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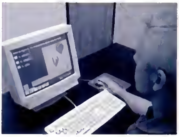

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working during IFR training because it really helps while he is reading a chart. His airplane also has an intercom. He just bought a Lightspeed 20/3G ANR headset and said, "so far it is a major improvement over my old passive headset and I should have done it sooner."

The only mechanical problem Dave has had came on a night IFR flight, in instrument meteorological conditions. The full electrical load caused a circuit breaker to trip, which wasn't noticed until the lights started dimming. The problem was quickly solved, but it did make him think about where he could land.

In answer to the question about the greatest risk found in flying general aviation airplanes, the following: "No question in my mind, weather."

For his next airplane Dave wants something with a bit more room plus more performance to better get to Colorado over the Sierras. His ideal would be a new Cirrus SR22, but he said he'd probably look at a used Bonanza and do some upgrades. Dave prefers low-wing airplanes because of the visibility, especially in the pattern.

Pilots like Dave are the cornerstone of general aviation. Sure, it would be better if he flew a bit more, but most pilots who fly for personal reasons just don't have cause or excuse to fly over 100 hours a year, if that much. So the question becomes one of staying sharp at flying on that level of activity.

Certainly a pilot who makes a lot of one- or two-hour trips on a regular basis is ahead of a pilot who concentrates a relatively limited amount of flying on a few big trips a year. Flying frequently gives a big advantage.

As far as instrument flying goes, it doesn't appear that Dave's flying will ever keep him legally current in actual conditions. Sure, he can fly six approaches, nav tracking and holding under a hood with a safety pilot and stay legally current. It would be good to go a bit beyond the rule, though, and that instrument proficiency check would be a good idea on an annual basis.

The Tiger is no match for any true storm system in the western United States, so the instrument flying is limited to dealing with stratus layers and benign en route conditions. The exposure there may be brief, but for the time the airplane is in the clouds it is vital for the pilot to be up to the task. There have been loss-of-control accidents out of stratus layers, and only one of those is available per customer.

The Tiger is a simple and well-behaved airplane, so the time Dave spends practicing and flying should be okay for staying up on airmanship. A flight review should burnish his skills, and that might also be a good idea on an annual basis, in addition to the IPC.

The equipment in Dave's Tiger is okay for limited IFR flying, though an IFR GPS with VOR/localizer and comm capability would sure be nice. A 1978 Tiger is worth $49,500 (133 percent of what it sold for new) according to *Vref*, an aircraft value reference, so a $10,000 or $15,000 avionics addition takes some rationalizing.

He doesn't fly with a handheld transceiver or GPS. At least the transceiver is something to not leave home without, and having both is a lot better. The cost of these things is quite low when compared with their value should an electrical problem arise.

Dave's look ahead to a new Cirrus or a used Bonanza is also something he might want to study carefully. Right now he has a simple used airplane with relatively good performance. The Cirrus is not much more complex, but it has more performance that in turn calls for better flying skills and more time spent on proficiency.

The used Bonanza would give more room and performance, but it's a big step up in complexity and maintenance costs. A new Bonanza rings the gong at $626,600, and no matter how little you pay for an old one, you'll be maintaining an airplane with parts that have to be as costly as those used to build the new airplane. There's also the matter of insurance and proficiency. Certainly a Bonanza is a lot more airplane to fly than a Tiger, and insurance companies will give Bonanza pilots more scrutiny than they give Tiger pilots.

Dave's thought that weather is the greatest risk is right on for a pilot who uses an airplane for travel. Best of all, it sounds like Dave Hock has a fine time using his airplane.

Flying Check Ride is a feature based on readers who express a desire to participate. Richard Collins follows up with e-mail questions and then prepares the report. We'd like to hear from readers who want to participate. E-mail flyedit@hfmus.com and tell us about your flying. Remember, though, that Richard can pick but one a month. ☐

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Calendar 2003

Compiled by Lori Singer

Cooler Breezes at Last

Bahamas Fly-In. September 5-7. Hawk's Nest, Cat Island, Bahamas. Call 800/688-4752.

British Air Power. Featuring the Spitfire. The Air Museum "Planes of Fame," September 6. Chino Airport, Chino, CA. Call 909/597-3722.

East Coast Fly-In. Sponsored by Regional EAA Chapters, September 6-7. New Garden Airport, Toughkenamon, PA. Call 215/761-3191.

Illinois Young Eagles Rally. EAA Chapter 101, September 7. Schaumburg Regional Airport, Schaumburg, IL. Call 630/543-9213.

Pennsylvania Fly-In Breakfast. Pottstown Aircraft Owners & Pilots 49th Annual Fly-In Breakfast, September 7. Pottstown-Limerick Airport, Pottstown, PA. Call 610/495-6366.

Vermont Fly-In. Basin Harbor Club 18th Annual Fly-In, September 7. Basin Harbor Airport, Vergennes, VT. Call 800/622-4000.

Intelli-Conference Symposium. Sponsored by Duncan Aviation, September 9. Duncan Aviation, Battle Creek, MI. Call 800/228-4277.

KR Gathering 2003. September 11-14. Red Oak Municipal Airport, Red Oak, IA. Call 402/493-6507.

Reno Air Races. September 11-14. Reno-Stead Airport, Reno, NV. Call 775/ 972-6663.

Beaumont Blazin' BBQ. 2nd Annual Championship and Fly-In, September 12-13. Beaumont Hotel, Beaumont, KS. Call 785/841-3100.

EAA Sport Aviation Rough River Fly-In. 28th Annual, September 12-14. Rough River State Park Airport, Falls of Rough, KY. Call 270/242-6976.

Indianapolis Airshow. September 12-14. Mount Comfort Airport, Indianapolis, IN. Call 317/291-6406.

Alabama Fly-In Breakfast. EAA Chapter 1320, September 13. Saint Clair County Airport, Pell City, AL. Call 205/884-4359.

Aviation Education Day. Sponsored by EAA Chapter 1291, September 13. Cochise County Airport, Willcox, AZ. Call 520/384-2908.

Bill Weir's Alternative Engines. September 13. Waterloo Regional Airport, Kitchener, Ontario, Canada. Call 519/461-0596.

Gateway Eagles Ninth Annual Fly-In. September 13. St. Louis Downtown Airport, Cahokia/St. Louis, IL. Call 314/780-0849.

Illinois Young Eagles Rally. Warbird/Antique Fly-In. September 13. St. Louis Regional Airport, Bethalto, IL. Call 888/562-9950.

Oklahoma Fly-In. Sponsored by EAA Chapter 98, September 13. Thompson Airfield, Tuttle, OK. Call 405/381-2840.

Parade of Planes. September 13. Cambridge Regional Airport, Cambridge, OH. Call 740/432-3726.

Texas Fly-In/Drive-In. 8th Annual Fall Fly-In/Drive-In, September 13. Sulphur Springs Municipal Airport, Sulphur Springs, TX. Call 903/885-7613.

Texas Young Eagles Rally. Sponsored by EAA Chapter 35, September 13. San Geronimo Airpark, San Antonio, TX. Call 210/380-2025.

West Virginia Young Eagles Rally. Sponsored by Chapter 1071, September 13. Shepherd Field, Martinsburg, WV. Call 304/754-7581.

New York Fly-In. Antique Airplane Club of Greater New York 40th Annual Fly-In, September 13-14. Brookhaven Calabro Airport, Shirley, New York. Call 631/589-0374.

North Central EAA "Old Fashioned" Fly-In. Includes forums, camping and air rally, September 13-14. Whiteside County Airport, Rock Falls, IL. Call 630/543-6743.

Potomac 2003. EAA Chapter 36 24th Annual Potomac Fly-In/Drive-In & Young Eagles Flights, September 13-14. Potomac Airpark, Berkeley Springs, WV. Call 717/294-3221.

RV Forum. EAA Chapter 486. September 13. Pancake Breakfast, September 14. Oswego County Airport, Fulton, NY. Call 315/668-9736.

The 2003 Cincinnati Lunken Air Show. Presenting the Tuskegee Airmen and aircraft from the Air Museum Planes of Fame, September 13-14. Cincinnati Municipal Airport Lunken Field, Cincinnati, OH. Call 513/321-4291.

Florida Fly-In/Pancakes. Sponsored by

PHOTO: RICK BRYANT

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EAA Chapter 1067, September 14. Naples Airport, Naples, FL. Call 239/352-1162.

Illinois Fly-In Breakfast. September 14. Ogle County Airport (Barnette Field), Mount Morris, IL. Call 815/732-7268.

New Jersey Young Eagles Day. EAA Chapter 891, September 14. Sussex Airport, Sussex, NJ. Call 973/764-1374.

Wichita Aviation Festival. Includes the U.S. Air Force Thunderbirds and a night airshow, September 18-21. McConnell Air Force Base, Wichita, KS. Call 316/337-9044.

Tulsa Regional Fly-In. 47th Annual Tulsa Regional Fly-In, September 19-20. Frank Phillips Field, Bartlesville, OK. Call 918/665-0039.

2003 Aviation Heritage Festival. September 19-21. Daniel Webster College and Nashua Airport, Nashua, NH. Call 603/577-6625.

Big Country Airfest. September 19-21. Abilene Regional Airport, Abilene, TX. Call 915/734-3644.

Pilot Proficiency Program. Mooney Safety Foundation Pilot Proficiency Program, September 19-21. Newport News/Williamsburg International Airport, Newport News, VA. Call 210/525-8085.

Springfield Air Rendezvous. 21st Annual Airshow, September 19-21. Capitol Airport, Springfield, IL. Call 217/789-4400.

EAA Open House. EAA Chapter One Annual Open House & Fly-In, September 20. Flabob Airport, Riverside, CA. Call 909/682-6236.

Hamburger Happening Fly-In. Sponsored by EAA Chapter 889, September 20. Shirley Williams Aerodrome, Kingsland, TX. Call 517/756-6999.

Skylark Fly Market. Sponsored by EAA Chapter 1310, September 20. Skylark Airpark, East Windsor, CT. Call 860/623-8085.

South Dakota Pancake Breakfast. Sponsored by EAA Chapter 289, September 20. Marv Skie-Lincoln County Airport, Tea, SD. Call 605/339-0242.

Planes, Trains and Automobiles. September 20-21. Reading Regional Airport, Reading, PA. Call 610/372-7333.

Virginia State EAA Fly-In. September 20-21. Dinwiddie County Airport, Petersburg, VA. Call 804/358-4333.

SAFE Association. 41st Annual Symposium, September 22-24. Adams Mark Hotel, Jacksonville, FL. Call 541/895-3012.

Bellanca-Champion Club East Coast Fly-In. September 26-28. Pottstown Municipal Airport, Pottstown, PA. Call 518/731-6800.

Cajun Fly-In. September 26-28. Allen Parish Airport, Oakdale, LA. Call 318/215-0090.

Aviation Day Fly-In. EAA Chapter 960, September 27. Flanagan Field, Farmville, NC. Call 252/753-7266.

Color Tour Fly-In/Pasty Feed. EAA Chapter 1270. September 27. Houghton County Memorial, Houghton, MI. Call 906/483-8226.

Compton Community Air Fair. Sponsored by the California Black Aviation Association, September 27. Compton-Woodley Airport, Compton, CA. Call 323/291-6358.

Illinois Fly-In/Veteran's Reunion. EAA Chapter 1155 7th Annual Little Egypt Fly-In/Veteran's Reunion, September 27. Mount Vernon Outland Airport, Mount Vernon, IL. Call 618/244-3303.

New England Section Poker Run. Sponsored by the New England Chapter of 99s, September 27. Includes airports in Concord, NH, Laconia, NH, Keene, NH, Springfield, VT, and Fitchburg, MA. Start at any airport. Call 207/647-2880.

Wood, Fabric and Tailwheels Fly-In. September 27, Lee Bottom Flying Field, Hanover, IN. Call 812/866-3211.

American Military History Event. September 27-28. Barber Airport, Alliance, OH. Call 330/823-1168.

Apple Harvest Fly-In. EAA Chapter 1041, September 27-28. Gettysburg, PA. Call 717/637-1587.

Fina-CAF AIRSHOW 2003. Featuring warbirds and The Canadian Force's Snowbirds, September 27-28. Midland International Airport, Midland, TX. Call 915/563-1000, ext. 2231.

Young Eagles Rally. EAA Chapter 579, September 28. Aurora Municipal Airport, Sugar Grove, IL. Call 815/286-7417.

Coming Events

SERFI. 13th Annual South Eastern Regional Fly-In, October 3-5. Middle Field, Evergreen, AL. Call 834/578-1274.

NBAA. 56th Annual National Business Aviation Association Meeting and Convention. October 7-9. Orange County Convention Center, Orlando, FL. Call 202/783-9364.

Copperstate Fly-In. Copperstate Regional EAA Fly-In, October 9-12. Phoenix Regional Grande Valley Airport, Maricopa, AZ. Call 520/400-8887.

Catbird Race. Catbird 500 Air Derby, October 10-11. Begins and ends at Bowman Field, Louisville, KY. Call Sylvia Hall, 502/625-1930.

AOPA. Aircraft Owners & Pilots Association Expo 2003, October 30- November 1. Pennsylvania Convention Center, Philadelphia, PA. Call 301/695-2000. ☐

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FOR THOSE WHO LIVE TO FLY.

Looks like another big winner from the Cessna stable of business jets

Citation Sovereign

BY J. MAC McCLELLAN

PHOTOGRAPHY BY PAUL BOWEN

THE NEW CESSNA CITATION SOVEREIGN IS A TRIUMPH OF THE practical over the possible. Relying on the formula that has made the Citation series the best-selling business jets of all time, Cessna created an airplane that does everything well without pushing to the edges of technology. The payoff is a midsize business jet with the biggest cabin in the class that can use the shortest runways, offer transcontinental range and cruise at a speed within a few knots of the others, all for about the same price. And to my eye, the Sovereign is one of the best-looking Citations yet.

In the late 1990s Cessna management was eyeing the business jet lineup looking for a category the company didn't already dominate. There were a slew of announcements of what came to be called "super-midsize" jets, including the Hawker Horizon, Bombardier Continental, now called the Challenger 300, and the IAI Galaxy, now named the Gulfstream G200. These three airplanes all offered standup headroom of six feet or a little more in the cabin and promised transcontinental or greater range.

The super-midsize jets offer a cabin cross section nearly the size of the ultra-long-range jets for about half the cost. Everybody wants a bigger cabin, but when the Cessna people

looked at the history of business jet sales, it was the Hawker family that jumped out. The Hawker 125 and its evolutionary models, in production since the early 1960s, have sold more airplanes than all others in the traditional midsize category. The cabin height in a Hawker is about five feet, eight inches, and passengers have obviously been satisfied with that. What if Cessna built a jet with a similar cabin cross section but with a much longer cabin and cavernous external baggage? Sounds like something people want. Thus the Sovereign was born.

Cessna announced development of the Sovereign in the fall of 1998 and made the first flight in 2002. The cabin cross section is the same size as that of the speedy and successful Citation X, but except for the forward fuselage, including the cockpit, the structural design is new. The overall length of the Sovereign's cabin is 34 inches longer than that of the Hawker 800, and the Sovereign has a 100-cubic-foot heated baggage compartment aft of the cabin, while all baggage is carried in the Hawker's cabin.

To lift the big Sovereign cabin Cessna needed a new wing design. The Sovereign is larger and heavier enough that it did not make sense to stretch the wing of one of the smaller Citations to fit. And the extreme sweep and high-speed capability

of the Citation X wing didn't make sense either. What Cessna designed is an all-new wing of long span and very large area, but with only modest sweep of 12.7 degrees at the quarter chord, and 16.3 degrees for the length of the leading edge. The trailing edge of the wing is essentially straight.

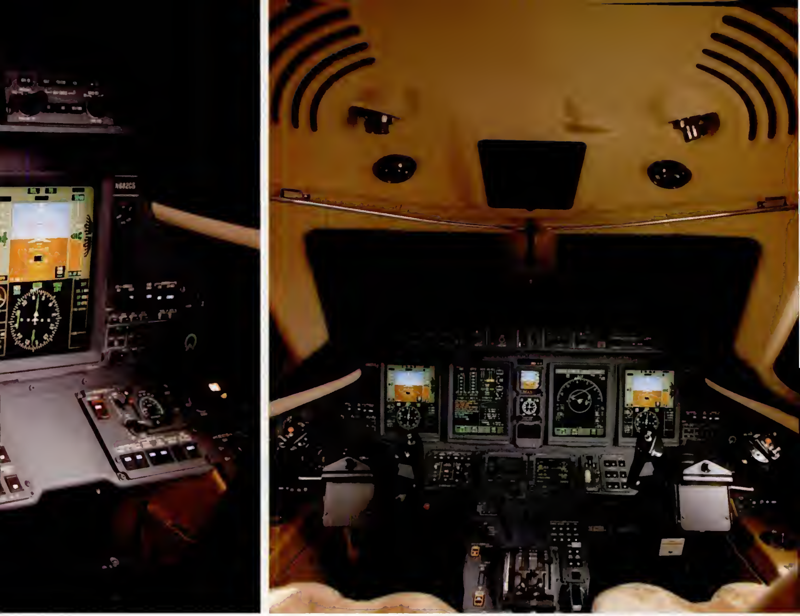
Wing sweep helps delay Mach effects as an airplane approaches the speed of sound, Mach 1. But wing sweep also reduces the efficiency of a wing at low speed, so landing and takeoff runway lengths grow, and a highly swept wing can have poorly damped Dutch roll characteristics and difficult stall behavior. These issues can be resolved with leading edge devices and other techniques, but the Sovereign design goals were to get the most performance with the least complication.

In addition to sweep, the airfoil shape can be used to help offset Mach effects at high cruise speed. Cessna chose to use a "super critical" airfoil for the Sovereign wing. The word critical refers to the so-called critical airspeed that is the speed at which the air flowing over the wing reaches Mach 1. Depending on airfoil thickness, sweep and shape of a wing, it will reach its critical airspeed at a true airspeed well below Mach 1 because the air must accelerate to pass over the wing. At the critical Mach airspeed, a shock wave develops because the local airflow has accelerated to Mach 1 and the shock wave creates tremendous drag and, depending on where the shock wave is located on the wing, can cause flying qualities problems.

A super critical airfoil, which was developed by Dr. Richard Whitcomb at NASA Langley, has a flattened upper surface that delays development of the Mach shock wave to a higher airspeed because the air doesn't have to accelerate over the curve of a conventional airfoil. A shock wave does develop at high speed with a super critical wing, but the shock is quite weak and is far aft on the wing compared to a conventional airfoil.

The flat upper surface of the super critical wing is a less efficient lift producer, but much of that is offset by a concave area near the trailing edge. Because the super critical airfoil can be thicker and still have less Mach effect drag, it can also be lighter because, in general, wing spars are stronger and thus lighter in weight in a thick wing. A thicker wing also provides more room to carry fuel, another important requirement for the Sovereign to achieve its transcontinental range.

Super critical wings have been around for some time with more or less success. Cessna had high hopes for the Sovereign wing but built in some cushion in case the theoretical benefits didn't materialize. The originally announced maximum Mach operating speed (Mmo) for the Sovereign was .78 Mach, not bad for a wing of such modest sweep angle, but early in testing Cessna found the wing was performing even better than it had hoped and extended Mmo out to Mach .80, the same as the



Honeywell's Primus Epic system dominates the cockpit of the Sovereign with four large flat-screen displays, dual flight management systems and a pair of track ball cursor control devices located on the center pedestal (lower right). Notice the automatic flight guidance controls mounted on the glareshield, the optimum place for both pilots to see and reach them. Systems are controlled by on/off push buttons that annunciate their status with words that change colors as an additional identification aid. The large handle in the center of the pedestal is the infinitely variable control of the speed brakes.

Hawker 800 and only .01 Mach below the Learjet 60.

The efficiency of the wing translates into very competitive cruise speeds. At 43,000 feet, the Sovereign trued 440 knots at mid-cruise weight. Down at 39,000 feet, the Sovereign accelerated to its Mmo in level flight for a true airspeed of 457 knots, nearly 20 knots faster than the original expectations.

The moderate sweep of the Sovereign wing also paid off in good low-speed behavior. There are no vortex generators on the wing and only three small stall strips on the leading edge, yet the stall behavior is so tame that no stick pusher is required, and a yaw damper is not required for flight at any altitude or airspeed.

The typical Sovereign cabin has plenty of room for two sets of four facing club seat arrangements with work tables and electronic displays for each seat. The potty is large, private and exquisitely finished. Cessna has pioneered the use of LCD lighting in the Sovereign in place of fluorescent or filament bulbs, providing uniform lighting with almost unlimited life. Even the overhead reading lights are LCDs.

Cessna uses conventional ailerons to initiate roll, which is then augmented by spoilers. All of the primary flight controls on the Sovereign are manual with no power assist, and the spoilers are hydraulically powered. There are a total of five spoiler panels on each wing, three of which are used to augment roll control, and all 10 can be raised as speed brakes in flight and to dump lift after landing.

The wing flaps are divided into three sections per side and cover at least 70 percent of the wingspan. The effectiveness of the electrically operated flaps lowers stall speed to the point that VREF approach speed at typical landing weights will be around 100 knots, or even less at light weights. Required landing runway at any normal landing weight is under 3,000 feet and at very light weights is under 2,500 feet.

Cessna chose the Pratt & Whitney 306C engines for the Sovereign. The Pratt 300 family of engines dominates the midsize category and is maturing quickly, so the 306C's 6,000-hour TBO is a welcome benefit. The engine is rated at 5,686 pounds of thrust on the Sovereign, but it has enough margin that it can produce that full rated power on a day 15°C hotter than standard, or to an elevation thousands of feet above sea level.

The 306C is, of course, controlled by full-authority digital engine computers (FADEC), so the pilot need only move the power levers to detents for takeoff, max continuous or cruise, without monitoring fan rpm or temperature. FADEC takes care of all the details from engine start to shutdown. Cessna has been slower to adopt FADEC control on other Citation models, but the technology is mature, proven and expected in an airplane of the Sovereign's performance.

The Sovereign is an all DC electrical airplane so there are no invertors and AC buses to power essential avionics. Because it is a DC airplane, Cessna decided to use starter-generators on the engines instead of air starters. An auxiliary power unit (APU) is standard, and it can produce compressed air to turn air starters on the engines as is normal on larger jets, but Cessna decided to stick with the simple and lighter starter-generator that has been the norm on other Citations except for the X.

The horizontal tail, like all other components of the Sovereign, is of all new design. It is placed farther up the vertical fin than other Citations, creating a true cruciform tail. It is also trimmed by changing the angle of incidence of the stabilizer instead of using trim tabs on the elevator as the smaller Citations do. There is a moveable tab on the elevator, but it is actually an anti-float tab that works in concert with the trim system to provide consistent pitch feel to the pilot at all airspeeds and altitudes.

Cessna faced some very difficult choices in design of the Sovereign cockpit. The company selected Honeywell's Primus Epic avionics system, which is also being installed in a number of other new jets. The Epic system has enormous capability to monitor and control everything in the airplane, not just the traditional avionics functions of flight instrumentation, communications and navigation. Cessna could have created a total push-button airplane that could literally be flown using a computer cursor and a kind of track ball mouse device, or it could opt to build on what it had done in earlier Citations. The Sovereign design team took a middle road by using many, but not all, of Epic capabilities, and I like the choices it made for this category of airplane.

Four eight-by-ten inch flat-panel displays dominate the Sovereign cockpit and provide all information necessary for primary flight display and engine and system monitoring. Dual flight management systems (FMS) handle all performance and navigation chores. And there are two cursor control devices mounted on the pedestal so each pilot can move a cursor on the screens to perform various functions. But if you don't like the cursors, you can operate the airplane using FMS buttons or a pair of knobs. There are no radio control units, or anything that even looks like a radio, in the cockpit, but you tune comm and nav frequencies using the keyboard or knobs on the FMS. I imagine even pilots flying together will elect to use different methods of controlling the radios, and the options are always there.

Another long overdue change Cessna made was to move the controls for the autopilot flight guidance system up to the glareshield, where they are best in view and easiest to reach for either pilot. Other Citations have used that prime real estate for thrust reverser and annunciator panel lights. Pilots use the flight guidance system controls dozens of times on every flight to enter new altitudes, headings, autopilot modes and so on, so they deserve the best seat in the house.

While Cessna was updating its cockpit design it brought the system control switches up to the current technology. Citations have relied on toggle switches for decades, but, like other current generation jets, the Sovereign has lighted push button switches. With the toggles you need to look at the switch to see its mechanical position to know if the system is turned on or off. But with the buttons the lighted nomenclature says the system is on, off or normal. The lights change color to make status identification even easier. This is nothing new but just another example of how Cessna is slow to change designs that have served well.

▪ The Sovereign cabin has plenty of space for a large galley area to hold full-sized meal trays, plenty of ice and beverages and warming equipment. Each passenger seat has controls for lighting and can be equipped with information or entertainment displays. Most airplanes will have a ninth seat forward in addition to the eight seats in the double club arrangement.

The belly fairing on the Sovereign is not as large or extreme as on the faster Citation X because the Sovereign has a maximum Mach of .80 compared to the .92 of the X. The Sovereign's dual-wheel nose gear and its steering system are adopted from the Citation X.

When you first look at the Primus Epic displays in the Sovereign they will seem cluttered and appear to be showing you too much information. But the displays can easily be de-cluttered to the level you want, and as information becomes unnecessary because all things are normal, it can be hidden, only to reappear if a system parameter moves out of the normal range. The primary flight displays (PFD) in front of each pilot are large, have clear annunciation and are straightforward to operate. Pilots transitioning into the Sovereign will have no trouble seeing and understanding the instrument flying information that is essential.

Cessna is flying three Sovereigns in development and certification and has completed the high- and low-speed testing and most of the runway performance work. The airplane I was invited to fly has a complete interior and is conforming to what is expected to be the final certified airplane late this year.

During a walk-around inspection I was struck by several impressions of the Sovereign. One is how big the airplane looks. The wing is enormous, with its 63-foot span and 516 square feet of wing area. A big wing is the key to rapid climb and good performance at high altitude, and the Sovereign delivers. Another feature is the new cabin door. Current certification rules make it almost impossible to build a door with sliding locking pins as other Citations use, so Cessna developed a door with cams that roll into beefy fixtures on the door frame to lock it in place. Cabin doors can be and have been big complications in some business jets, but the Sovereign door is of an elegant design that will please the people who build the airplane, those who maintain it and those who fly it.

Another impressive aspect of the Sovereign is the size of the aft baggage compartment. It's hard to visualize, at least for me, what 100 cubic feet of space looks like, but it's bigger than the hotel room most copilots are assigned. The compartment is heated, and there are steps on the door because you'll need to climb in to reach the corners.

The Sovereign was designed to MSG-3 maintenance standards, which is the norm in the airline industry. During development, components and structures are tested beyond the normal certification requirement to find out what wears or fails and how you can detect the problem. The result is that systems and components that annunciate a problem aren't inspected as often, so the end result is overall inspection intervals stretch out about 25 percent. It takes more time to establish MSG-3 maintenance practices during development of the airplane, but it pays off in less downtime once the airplane enters service.

Sovereign chief test pilot Wayne Spriggs prepared a flight profile that would show me the things we're all wondering about the Sovereign. In true test pilot fashion, Wayne had every detail on the computerized flight plan including "test conditions," such as climb to FL 430, accelerate to max cruise, and "full stalls clean and landing configs." I was happy to see that under the "limitations" line on the plan it was "standard," and the "risk assessment" block was labeled "low." It certainly didn't seem risky to me, and I'm happy Wayne agreed.

The first flying quality—and often one of the most disagreeable—that pilots and passengers experience in a jet is the brakes. It is very difficult to create brakes with the enormous stopping power necessary to use short runways that can still be smooth and gentle at taxi speeds. About 3,000 psi of hydraulic force is piped to the brakes to give them their power, but Cessna has solved the potential problems with the Sovereign. On my very first stop rolling out of the chocks I could halt the airplane with perfect smoothness using nothing but intuitive application of the pedals without any of the toe curling or other extra gentle techniques required for a smooth stop with many other brake systems. Stopping from a normal taxi speed without any jerking from side to side is a piece of cake in the Sovereign. These brakes are as close to perfect as I have experienced.

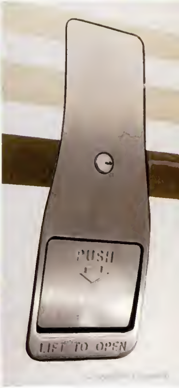
For takeoff we had about 6,300 pounds of fuel, enough for a flight halfway across the country. Our takeoff weight was just under 25,000 pounds, compared to a max takeoff weight of 30,000 pounds. Rotation would come at 112 knots and we needed only 3,640 feet of runway on a warm day in Wichita.

We were lucky that the controllers could approve an unrestricted climb, and with the throttles in the max continuous power detent, the Sovereign was through 10,000 feet in less than three minutes after takeoff with an indicated airspeed of 250 knots increasing to 260. In 16 minutes the Sovereign was through 41,000 feet, having burned 1,000 pounds of fuel, and two minutes later we were leveling at 43,000 feet. The certified ceiling is 47,000 feet, and the Sovereign will clearly get there with lots of fuel left.

Level at 43,000 feet, the Sovereign settled down at Mach .77, which equaled a true airspeed of 440 knots with nearly standard air temperature. Fuel flow was 1,480 pounds per hour. The Sovereign was very easy to fly at that high altitude, including steep turns using 45 degrees of bank. Cessna designed a mechanical system that adjusts aileron force with airspeed so the controls retain perfect harmony at all airspeeds and altitudes. Pitch forces, which normally change the most with airspeed and altitude, maintain a nice linear feel across the operating range with no extra mechanism to tailor the feel.

The speed brakes are proportional over their entire operating range, and you can pull on as much or little as you need to slow down or descend. I yanked them full out at FL 430 and there was very little pitch change and none of the rumble and buffet you would expect. After a rapid descent to FL 390, I left the power in max continuous and the Sovereign pushed up and through the Mach .80 MMO with the air temperature at standard. You can cruise at max continuous as far as the engines are concerned, but to stay in airframe limits, I pulled back to max cruise power which held a Mach of .79 for a true airspeed of 453 knots on 1,760 pph of fuel flow.

The Sovereign has dual wheels on all three landing gear, as you would expect on a 30,000-pound airplane. Part of the new Sovereign main cabin door design is a single-action latch (lower right) that meets a new certification requirement that only a single movement can be used to open or close a cabin door.



Citation Sovereign 680

The Sovereign flown and photographed for this report is serial number two and is the third one of its type built. The Honeywell Primus Epic avionics system, APU, single-point refueling, dual batteries and much more are all standard equipment. The specifications and performance numbers are provided by Cessna and are preliminary with certification expected late in 2003. Performance reflects standard day conditions at sea level.

Typical price	**$13.5 million**
Engines	**Pratt & Whitney PW306C, 5,686 lbs thrust each**
TBO	**6,000 hrs**
Passenger seats	**9 to 12**
Cabin aisle height	**5.7 ft**
Cabin width	**5.6 ft**
Overall cabin length	**29.3 ft**
Length	**63.5 ft**
Height	**20.3 ft**
Wingspan	**63.1 ft**
Wing area	**515.9 ft**
Wing sweep	**12.7 degrees**
Wing aspect ratio	**7.7**
Max ramp weight	**30,250 lbs**
Max takeoff weight	**30,000 lbs**
Basic empty operating weight	**17,800 lbs**
Max useful load	**12,450 lbs**
Max zero fuel weight	**20,300 lbs**
Max payload	**2,500 lbs**
Max fuel	**10,770 lbs**
Payload max fuel	**1,680 lbs**
Max landing weight	**27,100 lbs**
Wing loading	**58 lbs/sq ft**
Power loading	**2.6 lbs/lb**
Ceiling (certified)	**47,000 ft**
Pressurization	**9.3 psi**
Takeoff runway, max weight	**3,694 ft**
Landing runway, max weight	**3,144 lbs**
Climb to 41,000 ft max weight	**20 min**
Cruise (midweight) @ 41,000 ft	**437 kts**
Range, 45-min reserves	**2,820 nm**
Vmo/Mmo	**305 kts/.80 Mach**

Even at the airspeed limits and at high power, the Sovereign is a very quiet airplane. The curved glass windshields are adopted from the Mach .92 Citation X, so they are optimized to control high-speed airflow, and windshields are one of the biggest noise producers in an airplane, particularly the cockpit.

After another max effort descent, I flew steep turns and full aerodynamic stalls at 15,000 feet and can report that the Sovereign is as easy to fly and docile at the stall as any of the much smaller straight-wing 500-series Citations. The only difference is that the Sovereign's stall speeds are even lower, with the landing configuration stall coming well below 80 knots. That's why this airplane will deliver its full range and payload capability from very small airports.

Back at the airport the good flying qualities continued. The only hard part of flying an approach in the Sovereign is making yourself fly 100 or 101 knots on short final. Airplanes of this size aren't supposed to fly that slowly, but this one does. Trailing link landing gear with big dual tires makes for passenger-pleasing touchdowns.

Cessna has the Sovereign's weight well under control, thanks to an aggressive special weight savings team in engineering that attacked every ounce. That team probably saved 800 pounds of empty weight, and when you have a big cabin with at least nine seats, that's equal to four passengers' worth of payload. Cessna promised full fuel and full eight passenger payload and is on track with basic operating weight (which includes two pilots) of 17,800 pounds, leaving 1,680 pounds of payload when the tanks are filled to their 10,770-pound capacity. Tanks-full range stretches out to nearly 2,600 nm with an IFR reserve, enough to make it coast to coast westbound on all but a handful of extraordinarily windy days.

The Sovereign is already a success, with over 100 orders on the books, and the next delivery position available is in late 2006. Cessna expects to deliver the first one early in 2004 and work is well along already on serial number 14.

I came away from the Sovereign thinking that Cessna has done it again. The airplane offers everything that I want from a jet in the midsize category but doesn't waste weight and money on things I don't really need to fly the mission with security and comfort. ☐

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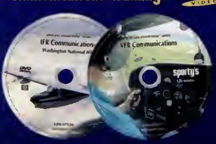

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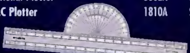

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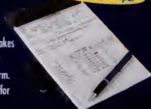

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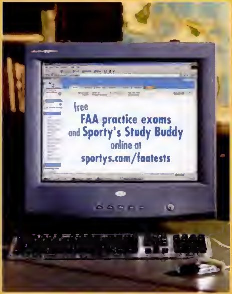

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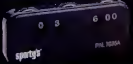

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RUSSELL MUNSON

Avoiding Thunderstorms Airline Style

BY LES ABEND

I SLID THE MOUSE ACROSS THE BLUE PAD, clicking on the left button as the white arrow on the monitor screen pointed to the "Radar" tab. The WSI weather map blinked to an animated picture of the continental United States. A well-defined line of red, outlined with irregular shades of green and yellow, stretched diagonally from the northern Gulf of Mexico across the Florida Panhandle through the middle of South Carolina, and then 100 miles off the U. S. coastline.

I sighed at the thought of encountering the ugly weather on my way up to La Guardia from Miami. With the white arrow positioned over the southeastern portion of the country, I clicked the left mouse button again. An enlarged view of the line of thunderstorms flashed into view. White vector lines of individual cell movement pointed to the northeast. Just above the scattered vector lines were three-digit numbers. I saw 450, 420 and 370. I clicked on the right mouse button. After a short delay, the line of weather moved in short bursts across the screen. The cycle repeated itself after a few seconds.

"We aren't going to get above that stuff," I mumbled to myself. A small crowd of other uniformed pilots had gathered. They looked over my shoulder at the WSI screen. I shuffled off to the side, allowing them a better view. A gray-haired captain with an open collar, his uniform tie hanging loosely down his white shirt, glanced in my direction.

"Which way ya' headed?" the captain inquired.

"Through that red stuff," I replied with a smile. The other captain nodded.

"Me too. Going to Newark. How about you?"

"La Guardia," I answered, looking back at the weather screen. "I think I'm going to cancel," I said with a smirk. A few chuckles and a snicker came from the small crowd. The other captain smiled.

"Good idea. Let me know how it works out," said the captain as he leaned in for a closer look at the screen. I nodded, walking toward a row of computer monitors in search of a phone to call dispatch. The conversation with dispatch would have nothing to do with a cancellation.

This is a scene I have repeated on countless occasions during the course of my career. I still find the "gonna go, You can't stop flying, but you don't go where the storms are.

anyhow" philosophy ironic. Why? Despite our professional education and experience when it comes to convective weather, we still choose to carry out the mission 99.9 percent of the time. And we still do the mission safely. It's not a matter of it being a "go" or "no go" decision but rather a decision of: which *way* are we going to go? With thunderstorm season upon us, I thought a discussion of airline weather avoidance would help draw some parallels to your operation.

As with any safe operation, en route weather avoidance starts on the ground. The scene I just described is my first step in the process of weather avoidance. I am sure my fellow pilots have seen me with a blank stare and a slack jaw, trying to visualize the geographic positions defined by a text message regarding a sigmet for severe weather. I am imagination challenged. (The imagination trait remains with my artistic mother.) That's why I take a look at the WSI weather screen first. My favorite books have pictures; why shouldn't my work tools? By studying the details of the weather, I can make sense of the text interpretation we receive in our computer-generated flight plans. I make an assessment for two basic reasons. The obvious reason is to have a good idea where the bad stuff is and where it is going.

The other reason was instilled in me during one of those lesson-building moments of my earlier days as a Twin-Otter copilot. I remember printing out every conceivable piece of weather information for our flight from Atlantic City to Philadelphia. With a puffed chest, I had presented my homework to my captain for his review. As quickly as he picked up my handful of paper, he had set it back down on the counter.

He had grinned, asking, "Okay, where do we go?"

I thought to myself, "What the heck kind of question is that?" Being 20-something years old, I had all the answers. I started by babbling out an explanation of our filed route. He interrupted me with another grin and a shake of his head. He saw my frustration.

Dumbfounded, I had countered with a, "Huh . . ."

Without losing his grin, he clarified the question by asking, "If the whole world goes to hell . . . if we lose our radios . . . if we lose an engine . . . or, if we have a fire . . . where do we go to get the airplane on the ground visually?"

The light in my head blinked. I returned his grin, muttering to myself, "Why didn't I think of that?"

With that humbling lesson in mind, I have my second reason for assessing the weather picture: I always want to have a basic idea of where to divert safely in case of an emergency. If I am flying a transcon, there may be many areas of nasty weather across the country. Having a general direction in your mind about which way to go could make all the difference. For instance, flying over the Rockies with an emergency unfolding can pose its own problems. Flying over the Rockies with an emergency unfolding *and* avoiding severe weather can pose even more problems.

Another source of current weather avoidance information is our dispatcher. For my airline, the dispatcher is only a phone call away. The dispatcher has more real-time weather resources available at his disposal. One of the most valuable resources is the "lightning-strike" map. The dispatcher can display this map on his computer screen. The lightning-strike map displays a real-time picture of lightning strikes on the ground. A high frequency of strikes is a good indication of the worst part of a line of thunderstorms. There have been quite a few occasions when I have scratched my head, attempting to understand the logic of a particular routing filed by a dispatcher. The routing seemed to fly directly through the red stuff. After a call to our dispatcher, I would get a clarification. The lightning-strike map indicated that the red stuff was dissipating. The weather I had seen on the WSI screen was moving away from our filed route. The caveat, of course, is that thunderstorms can build and rebuild in other areas. Only when you get to the weather will your flight have more real-time data than the dispatcher.

Dispatchers also work other flights. It's rarely just about you. There is a good chance that you can obtain a current pirep from a company airplane that has flown through the area of weather. The dispatcher may have already planned our flight based on pireps.

Dispatchers use the computer to file flight plans directly with ATC. If ATC is funneling airplanes through a break in a line of thunderstorms, the dispatcher will know which route to file. Changing conditions may dictate a rerouted clearance. Very often the reroute is given to us prior to our departure from the gate. My personal record for reroutes has been five for one transcon. The fifth and final reroute turned out to be the original clearance. The problem with a rerouted clearance for us airline types is not the time period between when the high altitude charts get frantically unfolded and we discover where we are going, but rather the time period required to determine whether we have enough gas to fly the new route.

ATC also has its own methods for weather avoidance. The airlines contend with three ATC methods most often. The first is "flow control." Flow control is simply a method to meter airplane traffic that is heading in a particular direction, heading through a particular area or heading to a particular destination. Although the days of airplane volume have not returned to pre-9/11 levels, there are still times when ATC can serve only so much traffic. This can occur when a line of thunderstorms affects popular routings. The Florida to New York corridor is a good example.

ATC flow control restricts airplane traffic by increasing "in-trail" distances. An in-trail distance is the minimum number of miles ATC will allow between airplanes flying similar routes. The smaller the area available to deviate through a line of weather, the larger are the minimum in-trail distances. Twenty miles or more is not uncommon. The in-trail restrictions translate to waiting on the ground until it's your turn. In theory, this method should save fuel by reducing the alternative possibility of making circles in a holding pattern. Unfortunately, the best-laid plans don't have guarantees. I have practiced my holding entries regardless of flow control restrictions.

With flow-control restrictions in place

because of weather, we are usually given an expect departure clearance time (EDCT). An EDCT is commonly referred to as a "wheels-up" time. Some of these EDCT times can become lengthy delays. This is when you see gate agents pulling their hair out. The decision has to be made to either keep our restless passengers corralled in the gate area or to board our passengers with the good possibility that they will be sitting on the airplane away from an airport hot dog. (If you've been an airline passenger lately, the sad fact is that an airport hot dog may be your best option.) EDCT times can change quickly. It is often advantageous to be in a position where your flight can be ready to depart. If the delay is not more than one hour, I usually opt for leaving the gate. Ground control will have a place for us to park the airplane. We'll shut down the engines to conserve fuel while we wait for our EDCT time.

ATC also uses a fairly new program for weather avoidance. It's called the severe weather avoidance plan (SWAP). This plan applies to U.S. East Coast airports north of Norfolk, Virginia. ATC has set up specific routes for specific airports. These routes are used when it is deemed that severe weather is affecting normal traffic flow. SWAP routes are identified by a given code number. If a SWAP route is given as a clearance after obtaining the original clearance, one has only to look up the code number to determine the points on the route. The points on the route are existing GPS waypoints already established on existing routes. My company's Jepp manuals have a page that illustrates all of the SWAP routes. These routes are all off the eastern coastline.

Another method utilized by ATC is simple. The appropriate air route traffic control center (ARTCC) calls the appropriate departure control facility and puts a "stop" on all departure traffic that has routings through the severe weather area. When traffic through the area decreases to a predetermined level, ARTCC allows the release of more departures. The problem with ATC ground stops is that nobody really knows how long the delay will be until departures resume. With a weather avoidance issue, there are many variables. (Explaining a ground stop to a captive audience of passengers crammed into a narrow aluminum tube is usually the most difficult part of the scenario, especially when they can see other airplanes landing and departing.)

So far, I have mentioned just about all of the ground-based safeguards available to avoid severe weather, except for one. The final safeguard is to just say "no." Rarely does this happen in an airline operation. If it does happen, it will

Puddlejumpers versus Thunderstorms

Very different than airline operations . . .

BY RICHARD L. COLLINS

THUNDERSTORMS ARE THUNDERSTORMS, AND WHILE I NEVER GAVE much thought to how differently we general aviation pilots have to think about them and deal with them when compared with the folks flying the big jets, it *is* two different worlds.

We do start out doing the same thing—studying the potential activity and the general weather picture before departure and trying to learn about the prospects for the trip or for the rest of the day. We don't have a dispatcher to help keep up with things and file new routings, but we have a lot of advantages when it comes to making a plan. There are a lot more airports that we can use as a port in a storm. And we have a lot more flexibility on time. For example, if thunderstorm systems are going to wane (no pun), they often do so around midmorning. The airlines can't write schedules around that, but we can often plan to get through a suspect area at about that time of day.

Part of our job description is not getting there on time and every time, either. Still, unless there is really bad activity in the first 100 or so miles, I might paraphrase the airline saying and mutter "Gonna go look, anyhow." If it looks bad, I can land.

Les mentioned the advantage of high flying in his jet. I would add speed to that advantage.

I had my friend John Cook, a retired Concorde captain, along on a trip to Oshkosh one stormy day. There were three areas to deal with along the way, and it almost drove John crazy. He was used to looking, making a decision and being by the area a few minutes later. In my P210 you look for a long time, and I think he thought the season was going to change before we reached one area being studied.

That's one reason I'm always willing to go look. You never know what it will be like in the hour or two, or more, it will take to reach the area of weather.

The other place speed comes into play is when the decision is made to divert. Going 150 miles out of the way in a jet might add 20 minutes to a flight. That might be an hour in a light airplane, and even bigger deviations might suggest that the whole plan is flawed.

Even though my airplane will go as high as Flight Level 230, it has little advantage over airplanes that can't go over 12,000 feet. Sure, there are days when a ride at FL 190 will give a better view, but in most thunderstorm situations those low flight levels are often really bad places to be. Flying around in canyons of clouds at 10,000 feet means there will be some potholes if you can't miss a cloud, but when clouds make canyons at the higher altitudes the business is a lot more serious. The cumulus growing through there are a lot closer to becoming cumulonimbus. There are a lot of broken pressurized piston airplanes in testimony to this.

most likely occur on the ground near the departure runway with the severe weather on the field or fast approaching. As airline pilots, we have been trained and schooled in the recognition of microburst conditions. When the visual picture is not pretty, then it's time to wait out the storm. When the radar picture isn't pretty, then it's also time to wait out the storm. Enough said.

As for airborne techniques in avoiding severe weather, let's be honest. A transport category airplane has a few things going for it already. High altitude is a big one. The days are long gone when the airlines had to spend the entire flight looking for the best hole in the middle of an ominous abyss of black clouds. Today, we can take a sip of coffee while we glance at the radar screen. We can say assertive things like, "Ask for 20 degrees to the right for 80 miles."

Before my colleagues start firing off e-mails to the editor, there is a little more to en route thunderstorm avoidance than simply putting fingerprint marks on the radar screen. When we are in daylight VFR conditions at altitude, assessing the intensity of a storm is a little easier. A picture is, of course, worth a thousand words. Having a good visual picture out the window helps to better interpret the radar screen. If a towering, black mass of rolling cloud with a well-defined anvil fills the windscreen, there is usually little doubt about which direction to turn. The radar serves to confirm the most serious portions of the storm. The anvil serves to point in the direction of storm movement. Deviating to the upwind side of the storm is usually the best course of action for two major reasons. Number one, the storm will be moving away from your position. Number two, the least amount of turbulence from a storm can be found on the upwind side.

There are times at the higher altitudes that a bad thunderstorm may be just below the flight level of the airplane. Our company policy suggests that we clear thunderstorm tops by at least 5,000 feet, 10,000 feet if feasible. By tilting the radar antenna down, the intensity of a thunderstorm can be determined. Even

JIM REED PHOTOGRAPHY

The fact that we fly in the weather instead of above the weather makes a substantial difference in the way we deal with thunderstorms. Avoidance is more difficult and must be based on either what we see or on electronic information. The electronic stuff is great, but there breathes not a pilot who doesn't feel better about the proceedings if he can see what is going on.

We do have some advantages on electronic information. Les mentioned that their folks on the ground watch lightning strikes and by so doing they know when an area of activity is weakening. With a Stormscope or StrikeFinder we can do that in our own cozy little cockpits. How or why the airlines have flown all these years without lightning-detection equipment, I know not. In its present form it is far from exact, but it is still an important tool to use in storm avoidance.

The other thing we can now have is the up or downlink of the Nexrad picture. With that, we have the same big picture of activity that is available on the ground.

Our airborne weather radar isn't as good because of the smaller antenna size, but this has more to do with effective range, and we go more slowly so that doesn't count for as much. We don't need a good picture more than 40 miles ahead for close avoidance work.

If all else fails and the airplane winds up in convective clouds, or clouds associated with convection, the weight and size of their airplanes gives them an overwhelming advantage.

The airlines fly a lot more than we do and deal with far more thunderstorms than we do. On average we lose about eight airplanes a year to storms, most en route. I can think offhand of three airline jets lost en route to thunderstorms in the United States since the airlines started flying jets back in the '60s. One tried to penetrate a squall line and the turbulence broke the tail off the airplane. One had both engines snuffed out in heavy rain and hail. And one suffered a lightning strike that ignited fuel. You probably never heard of any of these because you aren't as old as I am. They are ancient history.

Airline aircraft don't have as much G-tolerance as do our airplanes, but their higher weight and wing loading mean they get less displacement from a vertical gust. They are, in fact, designed for 66 foot per second vertical gusts, where our airplanes are designed for either 35 or 50 foot per second vertical gusts. There are different ways of calculating the onset of gusts, so these numbers are not absolute comparisons.

The strength of the airframe doesn't have that much to do with it, anyway. The one airliner that had a structural failure, way back when, encountered almost tornado winds at low altitude. Few of the general aviation airplanes lost in storms have gust-induced structural failures. In almost every case the pilot loses control of the airplane.

Can we stay in control in a thunderstorm, where the swirling eddies of air in the shear zones might be large enough to contain our whole airplane?

I think it is questionable, especially in stronger storms, though I do think that our airplanes have the control authority to make it through a storm if we make all the right moves.

In over 50 years and almost 20,000 flying hours, I have but once flown an airplane into the bowels of a thunderstorm. I've flown under a lot of them, and gotten up close and personal with others, but only once have I made the big mistake.

It was a long time ago, before we had any radar advice about storms. We could look at the forecasts and read the sequences, but on November 7, 1957, there was not much real information about thunderstorms. There was no radar in the airplane, either.

The flight was from Fort Smith, Arkansas, to Little Rock.

though it might appear tempting to overfly a storm, a glance at the radar screen may give you second thoughts. Convective activity is an ongoing process. The air above a thunderstorm may be at risk of becoming a new part of the storm. Why take the risk of spilling a scotch and soda on a first-class passenger? The illumination of the seat belt sign is rarely a deterrent for anybody. I approach each thunderstorm as though every passenger is ignoring the sign.

Our company manual requires us to avoid general thunderstorms by at least five nautical miles (nm). These are storms with tops between 25,000 to 30,000 feet. We are required to avoid severe thunderstorms (tops above 30,000 feet) by at least 10 nm on the upwind side and 20 nm on the downwind side when we are below the freezing level. Above the freezing level we are required to avoid a severe thunderstorm by 20 nm on all sides.

En route weather avoidance is fairly straightforward. Have you heard the phrase, "Don't be late, penetrate"? Well, it's not a philosophy airline pilots practice. As a matter of fact, one of my favorite words is "unable." If I am given a heading by ATC that doesn't look appetizing, I don't hesitate to use that word. Diplomacy is, of course, the best way to achieve positive results. I'll try to say things like, "Uh . . . a 330 degree heading would work out better for us." In the worst case, I will exercise my emergency authority. It has to be stated that you are using your emergency authority. Rarely are there are any repercussions, let alone paperwork. I have even had controllers exercise emergency authority on my behalf when it involved a weather deviation. On the last occasion that I recall, I believe the controller was justifying my entrance into active military airspace.

As for arrival or departure weather avoidance, there are many variables. I could make mention of a few techniques, but it really comes down to one common denominator. The common denominator is simply JUDGMENT. Experience is the primary teacher of judgment. Airline pilots exercise this judgment every day on the job, severe weather or not. If you are not comfortable with your own experience, then make the decision not to go, or go elsewhere where you are comfortable. That's really the moral to my story. When it comes right down to the cold hard truth, nobody has to say, "I'm gonna go, anyhow." ☐

This was a route that I had flown many times, and I was familiar with the fact that some nasty weather occurs between those two points. This day, through 23-year-old eyes, I could see that the sky ahead was ominously dark, but I flew on.

I was flying a Beechcraft Twin Bonanza, which is about as sturdy a steed as you might find. When I got in the storm, I wasn't worried about the airframe, I was concerned about Richard's ability to keep the airplane right side up. There was never any question that I had the control power to do so. The question revolved around the correct interpretation of the instruments as the airplane pitched and rolled, almost violently at times.

I knew, too, that it was going to get worse before it got better because it was a west to east flight, the thunderstorm was moving east, and one of the meaner areas is on the east side of an easterly moving storm.

And it did get worse, but at least the worst part did not last long.

The airplane lost some paint on the leading edges, and I reflected on the experience as something that I would try hard not to repeat. Had I been my employer I would have given me a raise for getting through the storm and then fired me for flying into it in the first place.

I have ridden through a few thunderstorms on airline aircraft, one in the jump seat of a foreign airline with a good view of the proceedings.

There was a line of storms blocking the way. The captain studied the radar carefully and picked what looked like the best way through. I was watching and could only agree that the path he selected was the best one, though it did not look particularly good.

As we moved into and through the storm area I was amazed at the difference in the way the 727 rode out the storm compared with my recollection of the experience in the Twin Bonanza. It was not a place you would want to go on a regular basis, but the captain, who was hand flying the airplane, wasn't having any problem keeping it under control. The displacements just weren't that large. I've ridden through clear-air turbulence that felt worse, and turbulence doesn't seem as bad when you can see outside.

I think the ride was a little wilder than he expected, though, and because there was a member of the British royal family in the cabin, the captain wrote up the ship's radar after the flight, presumably in case there was some complaint about the ride.

It has to be added that no two thunderstorms are alike and no experience prepares a pilot for everything. There is probably a storm out there with every pilot's name on it. The only way to handle that is to avoid them all.

The footprint of thunderstorm activity can be much larger for light airplanes. The avoidance rules of thumb are the same as mentioned by Les for airliners, but there are times when, at our cruising altitudes, we need more berth. This is especially true where there is a line of activity.

Lines can often be broken, with gaps of acceptable width available for passage. It is a fact, though, that conditions all along any line that forms are conducive to thunderstorm development. That means it will be rough in the clouds in any gap, maybe rougher than we want to fly. Again, any visual sighting should be taken at face value. If it looks mean, it is mean.

The good news is that we have more tools available than ever before. This is especially true for airplanes that can't have airborne weather radar. Even if you don't have an uplink/downlink system, the air traffic controllers have the Nexrad depiction available on their scopes. Lightning-detection equipment is inexpensive, and if the word of the device is heeded, and it is used for gross avoidance and never for penetration of an area, it is effective. You might go farther out of the way than necessary, but that's okay. We all need the flying time.

What we don't have is the FAA system of shutting down routes or terminal areas that are about to be or are affected by storms. We are pretty much on our own there, and both Mac and I have experienced a situation around a major terminal where the controllers said we could do anything we wanted because there was nobody else out there.

That's a spooky feeling, but, as is true anywhere, if the weather ahead looks okay, without question, after using all available information, carry on. ☐

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From 172 to Regional Jet

By Amy Dodgen

IT'S TRUE; it can still happen. Even in today's bleak economy, though the outlook is grim for a lot of the majors, it's still possible to get a job in the right seat of a regional jet. You might even find yourself transitioning to that position straight from the right seat of a Cessna 172. It happened to me in the fall of 2002, when I was working as a CFI in Atlanta, Georgia, and least expecting it.

I was incredibly lucky, I realize, especially in today's aviation climate, to get the coveted job with a regional airline. With my dream job, however, came the responsibility to work harder than ever in order to make the leap from flight instructing in a small piston airplane to piloting the complex Embraer Regional Jet I would be flying in a Part 121 operation.

I think the first clue I had that there would be major differences between my old job flight instructing at a Part 141 school and my new job in the Part 121 environment came during indoctrination training at my new company. As a flight instructor, I was accustomed to making my own schedule and enforcing my own rules in the airplane I flew. Certainly, I followed FAA regulations and the policies set out by the school I worked for, but after that, I was the boss in the cockpit.

When we started going over company policies and procedures during my indoctrination, I realized that my old way of life was about to change drastically. Rules and regulations now existed to cover practically every aspect of my new job, from the proper way to fill out a maintenance log to the way I wore my hair and uniform. Many of the rules derived from familiar FAA regulations. For example, the 1-2-3 rule for filing an alternate airport on an IFR flight plan (if between one hour before and one hour after your estimated time of arrival the weather is forecast to be below a 2,000-foot ceiling or three miles visibility, a filed alternate is necessary) still applied. Other regulations, however, were new. In a pinch, an FAA-authorized exception would now allow me to fly temporarily as a required flight crewmember without having an actual pilot or medical certificate on my person, with proper company confirmation of the certificate, to name one.

All of these directives, both the familiar and the ones I was being introduced to for the first time, had to be carefully transcribed on note cards and then committed to memory, as we were quizzed daily in class on new material. It was a good bit of information to memorize. In the course of all my flight training to date, I can safely say it was the most studying I had ever been required to do in a short span of time.

In addition to the new rules, I began to realize during that first week of training that my ability to do my job would now be linked to a whole network of people—dispatchers, crew schedulers, mechanics, gate agents and many others. Everyone would have to work together to accomplish the common goal of safely transporting passengers to a destination. I learned that if one piece of the puzzle is missing, delays and other complications occur that can adversely affect flying customers in multiple cities. In other words, a weak personnel link or a situation beyond anyone's control, such as a weather delay, that causes one late flight can subsequently cause many negative repercussions.

Working with a vast number of people was in marked

PAUL BOWEN

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...Making the Transition

contrast to my situation as a flight instructor, where the only people affected by a late aircraft would be me, my student and maybe the next person on the schedule for the airplane. While the concepts of teamwork and crew resource management were hardly alien to me as a CFI, learning to depend on so many others in order to effectively accomplish my job was a big change.

At my flight school, the bulk of my responsibilities was based on my ability to fly the airplane and how well I was able to teach. My interaction with the airplane was much more immediate and unfettered by unrelated tasks. As an airline pilot, I am not only responsible for flying the airplane safely but also for serving as a customer service agent of sorts for the passengers I deal with on a daily basis. When you compound those duties with filling out reams of paperwork, making manual revisions and keeping up with new rules and regulations, the job, especially while you're becoming acclimated, becomes much more than just flying the airplane.

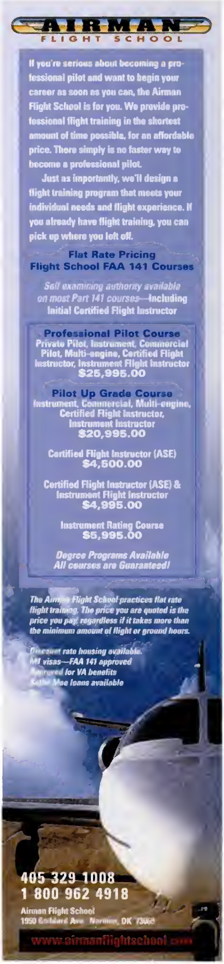
I thought that actually learning to fly the regional jet, once I had been introduced to company policy and procedure, would be the best part of my transition, and in many ways it was. However, I was overconfident at first that my simulator training would be the easiest part of my training. After getting into the simulator that first day, though, I thought differently. While the ERJ has a reputation for being easy to fly, and it certainly is with a little practice, the full-motion simulator is notoriously sensitive. That sensitivity, coupled with the newness of adjusting my scan to the glass cockpit after many years of flying with analog instruments, made my first two sessions in the simulator a little ugly.

The glass cockpit instruments in the Embraer are designed for ease of use, but during those first few hours, they were anything but easy. My eyes roamed frantically, searching for my beloved airspeed indicator, but it was nowhere to be found, at least not in its familiar incarnation. Instead, it existed in "tape" form, scrolling up and down rather than on an analog instrument. Reading it was, initially, far from second nature. Until I became accustomed to the new instruments, stalls, steep turns and even level flight all needed work. It was even difficult at first to read the engine indications depicted on the glass. My entire scan had to be adjusted.

The vast differences in airspeeds in a Cessna 172 and an ERJ proved to be another challenge. I had always heard, "Everything happens so much faster on an approach in a jet." This observation is obviously true; you always have to be one step ahead on an approach when you're flying it in a faster airplane.

But it wasn't so much the speed of the approaches in that first session that was difficult to get used to as it was to keep my altitude hold to ATP standards. When you're flying at 250 knots, it's so much easier, and quicker to get 50 feet off your altitude than it is in a Cessna 172 at 100 knots. You glance away for a second while hand flying the airplane, look back, and you're suddenly 200 feet off your altitude. Leveling off was different too. The first time I tried to level off at 5,000 feet in the simulator, I attempted to do it slowly and gently, forgetting for a moment that I was no longer climbing at 500 feet per minute. When your climb rate is 2,500 feet a minute, starting a slow and gentle level-off at 4,800 feet for 5,000 feet is simply not going to work if you want to reach any approximation of the desired altitude.

Maneuverability was a lot different, too. Flying in a small single engine airplane, I had the free-



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dom to maneuver in tight spaces or slow down or speed up in a relative hurry. The jet requires more forethought and is not nearly as forgiving. Overall, transitioning from the smaller Cessna to the regional jet was a little like moving from a cool little VW bug to a really cool oversized SUV. But, as with any new skill, repetition is the key to learning. Once you learn "the touch" that it takes to control the aircraft, flying an RJ really is like flying any other airplane. The fundamentals, i.e. dropping your wing into the wind on a crosswind landing, keeping your scan moving in IMC, etc., remain the same.

Before moving into the ERJ, I had very little experience with a flight guidance system or an autopilot, much less a flight management system (FMS). These tools can greatly assist the pilot, making the job of managing a large, complex airplane much easier (or can make the pilot too complacent, depending on who you're talking to). The autoflight system of the airplane, however, also took some getting used to. My instructor in training called it the "soul of the airplane," and it really is an extremely useful piece of equipment. Once the system is familiar to you, it's simple. However, learning how to navigate through countless FMS pages, scrolling knobs and pushing buttons while simultaneously hand flying through heavy turbulence is another matter.

Yes, the flight director bars can help enormously when it comes to holding constant pitch angles, banks or altitudes, but after years of flying "raw data" with nary a flight director bar or autopilot in sight, is it any wonder I was a little skeptical of the autoflight system? Indeed, it doesn't pay to become too reliant on the little pink bars of the flight director, or "George," as the autopilot is affectionately referred to. If the system has a glitch, or if, more likely, the pilot strikes the wrong button, blindly following misdirection by the flight guidance bars can become very dangerous. I use it often, but I've also realized the importance of maintaining situational awareness and reading the flight director bars with a grain of salt.

When I finally got out on the line, my biggest challenge was not so much the busy airports and increased radio communications. I was already used to controlled and high density traffic airspaces. Nor was it the approaches—those had been pounded into my head enough during simulator training. What really got me those first few flights was the descent planning. I had heard that descent planning was a typical problem for new first officers with little high-altitude experience. I learned quickly that ATC cannot always accommodate lower altitudes as soon as I would like and occasionally must issue altitude clearances that require more rapid descents than those to which piston pilots are accustomed. With the assistance of one of many "rule of thumb" formulas for descent planning, plus the assistance of the FMS, which can give a glideslope to assist with altitude restrictions, I quickly conquered descent planning.

In general, during the course of my training, I felt simultaneously exhilarated with my new job and frustrated because I wasn't an expert at it already. One of the toughest parts of the whole training process for me, as a former full-time instructor, was learning to accept the fact that I was no longer in charge. It was difficult, after years of being something of an authority, to suddenly find myself in the role of student again. Of course, as with any airplane, flying the RJ is a lifetime learning experience. Out of the line, the captains I have flown with have helped me to continue to learn by unselfishly sharing their considerable knowledge about and experience with the airplane. There is always more to learn, and there are always different methods for improving your techniques in any aircraft.

I was a fairly low-time pilot when I was hired by my airline, most of it earned instructing in the right seats of small airplanes and flying an ancient twin-turboprop jump plane on the weekends. In this economy, I certainly had no high hopes of getting picked up by any airline, but my résumé found its way to the right person at the right time, and I found myself in the job I had dreamed long and hard about at the least likely time. In an economy like this, with hiring on the downside, it is important to continue to fly and improve your credentials. There is an intrinsic value in "paying your dues," and ultimately common sense, working hard and being conscientious pay off. If flying for a regional airline or a corporate or charter operator is your goal, with perseverance and a passion for aviation, you might find yourself making the transition sooner than you think. ☐

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PIPER Upgrades the Meridian

BY J. MAC McCLELLAN

EVERY PILOT WANTS MORE USEFUL LOAD, AND PIPER PROVIDES 242 more pounds of it in its new Meridian single-engine turboprop, thanks to an increase in maximum takeoff weight. And the company also switched to the new Meggitt Magic 1500 autopilot that offers the performance and features a pilot expects in a turbine airplane.

When Piper introduced the Meridian in 2001 it had a 4,850 pound maximum takeoff weight, which was capped at that level by the FAA requirement that single-engine airplanes stall at 61 knots or less at maximum certified weight. With more than 1,000 shaft horsepower available from the Pratt & Whitney PT6A-42A engine, power to lift more weight was never a question. The Meridian wing and other primary structure also had the heft to carry extra weight. But the stall speed rule was limiting what the Meridian could carry.

Piper had a couple of choices available to increase the takeoff weight of the Meridian. One was to demonstrate improved crashworthiness to get a couple extra knots added to the maximum stalling speed. Socata had achieved this with its TBM 700, and Pilatus had done the same with its PC-12. The other option available was to reduce the stalling speed so the airplane could carry more weight up to the 61-knot maximum.

Piper engineers decided to focus on reduced stalling speed to achieve the increased weight goal. The primary driver in their decision was to control empty weight. Increasing the max takeoff weight adds to the useful load only if the empty weight of the airplane doesn't increase in the process.

One way to reduce stalling speed is to improve the efficiency of the wing flaps. The 61-knot maximum applies to the landing configuration, so any improvement in flap effectiveness would do the trick. But the Meridian flap is already very long in span, consuming most of the trailing edge of the long, slender wing. And the design of the flap itself, and its extension angle, is pretty well optimized, so very little, if any, improvement was available by modifying the wing flaps.

The other available option to reduce stalling speed is to micromanage airflow over the wings and tail. Airflow can be tailored by some sort of a small device on the airframe that generates a high-energy wake when the wing is flying at certain angles of attack. These devices go by many names, but the term vortex generator (VG) covers the category because it best describes what the devices do—generate a vortex.

The energy in the vortex that streams aft from a VG is used to direct air to flow the way the aerodynamicists want it to over the wings or tail. It would seem logical that air wants to flow straight aft over an airfoil, a straight line being the shortest distance, and all of that. But when a wing or tail is operating at a high angle of attack, many forces interact to cause the air to try

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to flow in all sorts of directions, including spanwise, or even forward. The energy in the vortex created by a VG acts as a fence to keep air flowing in the desired direction, which is aft. Years ago many jets had physical fences in the form of a chordwise blade that directed airflow near the stall, but the physical stall fences have virtually all been replaced by some form of VG.

Piper experimented with various VG configurations and came up with a series of 92 on the wing and 80 on the underside of the horizontal stabilizer that reduced stall speed. The tiny VGs are bonded to the surface and weigh only a few ounces. The VGs resemble little I-beams with beveled leading and trailing edges and are a fraction of an inch high. They add an immeasurably small amount of drag at cruise angle of attack, but as the airplane approaches a stall, they help keep the airflow attached to the surface and smoothly flowing aft to a lower airspeed. Thus, the Meridian can weigh 5,092 pounds and stall at 61 knots, compared to 4,850 without the VGs. In addition to being extremely light, the VGs require no maintenance, and you can dispatch with as many as five missing.

The only other change to accommodate the higher takeoff weight is some strengthening in the landing gear area. Though the VGs could easily be added to any existing Meridian, the changes to the landing gear make a retrofit to the higher takeoff weight impractical at this point.

A current production, typically equipped Meridian weighs in at around 3,390 pounds. With a max ramp weight of 5,134 pounds, that leaves a useful load of just under 1,750 pounds. Fill the 170-gallon tanks with jet fuel and you have just over 600 pounds of payload available for people and baggage. And that's fueled for a four-hour trip with IFR reserves. Leave out an hour's worth of fuel and you can fill the seats and still fly 500 nm and longer trips.

The other big improvement new to the Meridian this year is the Meggitt Magic 1500 autopilot in place of the original S-Tec 550 system. The 1500 autopilot is the first from Meggitt/S-Tec that uses attitude information, as well as rates of change in rate of turn and air pressure, to fly the airplane. Using attitude information to fly the airplane is the way most other autopilots function and the way all other turbine airplane autopilots operate, and it works well, and so does the new Magic 1500.

The highest praise I can bestow on the Magic 1500 system is that I felt no need to study the operating manual before using the autopilot. Its modes of operation and its annunciations are what any pilot with experience in turbine airplanes would expect to find. Mode selection buttons, altitude assignment and all annunciation are included in the autopilot control panel mounted in the center of the instrument panel where it is easy to see and use.

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To take a look at how the Magic 1500 flies the Meridian, we launched into a relatively low IFR day at Westchester County Airport in New York headed for Bradley Field in Connecticut. The 1500 system is part of the full glass panel Magic electronic flight instrument system that has been standard in the Meridian from the beginning. The dual electronic displays are backed up by independent attitude, airspeed and altimeter instruments mounted in the center of the panel.

I selected go-around mode, and the flight director command bars on the primary flight display (PFD) provided target pitch angle for rotation. Go-around mode was missing on the original autopilot. Climbing through 800 feet on the Westchester One departure I engaged heading mode and cranked the heading bug around to 320 degrees, a big turn from the 160-degree runway heading. The 1500 is an aggressive autopilot, rolling smartly into a 30-degree bank and holding that angle all the way through the turn. That's steeper than the 20 degrees or so most autopilots would bank at Meridian airspeeds, but the bank angle control was precise, and you sure can't argue with the rate of turn it delivers.

Like the best turbine autopilots, the Magic 1500 altitude alerter is automated into the system. When you dial a new altitude into the alerter, the 1500 is automatically armed and ready to capture that new altitude without any other button pushing or knob twisting to arm a capture mode. I can't remember which autopilot introduced this feature, but it's great. Why would you ever want to climb or descend through the assigned altitude you have dialed into the alerter? You don't. So why force pilots to arm altitude capture? The Magic 1500 does not, and it's great. You'll never fly through a target altitude without the autopilot capturing it, or the flight director commanding a level off if you are hand flying.

2003 Piper Meridian

The airplane flown for this report was equipped with the Meggitt Magic avionics system that includes dual flat-panel EFIS on both sides of the cockpit, plus the new Magic 1500 autopilot as standard equipment. Garmin GNS 530s are also standard, as is the Bendix/King RDR-2000 vertical profile weather radar. All data here is from the Pilot's Operating Handbook and reflects standard day conditions at sea level.

Price	**$1,750,000**
Engine	**P&W PT6A-42A, 1,029 shp flat rated to 500 shp**
TBO	**3,600 hrs**
Propeller	**Hartzell, 4-bld, 82 in dia**
Seats	**6**
Cabin height	**3.9 ft**
Cabin width	**4.1 ft**
Cabin length	**12.3 ft**
Length	**29.6 ft**
Height	**11.3 ft**
Wingspan	**43 ft**
Wing area	**183 sq ft**
Wing aspect ratio	**10.1**
Max ramp weight	**5,134 lbs**
Max takeoff weight	**5,092 lbs**
Typical empty weight	**3,384 lbs**
Max useful load	**1,750 lbs**
Max usable fuel	**1,139 lbs**
Max zero fuel weight	**4,850 lbs**
Max payload	**1,466 lbs**
Payload max fuel	**611 lbs**
Max landing weight	**4,850 lbs**
Wing loading	**27.8 lbs/sq ft**
Power loading	**10.2 lbs/shp**
Ceiling (certified)	**30,000 ft**
Pressurization	**5.5 psi**
8,000-ft cabin	**@ 25,000 ft**
Rate of climb	**1,556 fpm**
Time to climb	**19 min/FL 250**
High-speed cruise	**260 kts**
IFR range, max cruise	**1,000 nm**

The Magic 1500 has a built-in aural alert system that uses a female voice to announce events such as approaching an assigned altitude and so on. The voice callouts are helpful under most circumstances, but they can be intrusive in very busy airspace where the controllers talk nonstop. In that case, it's easy to silence the callouts.

The Meridian is a strong climber with its full-rated 500 shp available to about 25,000 feet, and the Magic 1500 has the smarts to anticipate the level off and altitude capture smoothly without any abrupt attitude or vertical speed changes. The autopilot's control of the airplane is precise at all airspeeds and it smoothly handled some turbulence we encountered descending through a cloud layer.

The controllers at Westchester gave the Magic 1500 a real challenge by vectoring us through the localizer and then back to intercept about two miles outside the outer marker. I had told the controller I didn't mind a close turn on to the ILS and he needed to get us spaced behind an American Airlines Fokker 100 ahead.

The Magic 1500 showed its stuff on the intercept, and its 30-degree bank capability came in particularly handy to nail the localizer without any S-turning after the needle centered. I let the autopilot fly the Meridian below decision height, and its tracking of the ILS was smooth and precise all the way.

Most of the time the Magic 1500 uses roll steering outputs from the standard Garmin GNS 530 navigation systems to smoothly track the desired course. The roll steering is smoother than tracking needle deflection as previous autopilots have done, and it allows for smooth turns at leg changes as the Garmin navigator calculates and commands a leading turn to stay centered on course during leg change.

The takeoff weight increase will cost a knot or two of maximum cruise speed until fuel burns down, and then performance will match that of the original Meridian. Expect 260 knots, or a little more, at optimum cruise, and if you fly at FL 290 you can stay up for four hours with an acceptable IFR reserve. The new takeoff weight limit doesn't change range, but it does change the range versus payload profile. In other words, in the new Meridian you can carry more people and stuff farther than you could before.

In early summer the Piper people told me that they experienced a sudden and strong increase in demand for the Meridian. A small inventory of Meridians was on hand in the dealer network, but that quickly shrank as pilots started serious shopping for high-performance personal airplanes. No doubt the new accelerated tax depreciation law had something to do with it, but the important changes Piper has made in the Meridian's max takeoff weight and autopilot system are also important. Every new airplane needs to grow and improve, and it's gratifying to see that Piper is adding more capability to this exciting personal airplane. ☐

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On The Record

The following are excerpts of official NTSB summaries of general aviation accidents in the continental United States.

PIPER PA-28-140 CHEROKEE

Phoenix, Arizona

Injuries: 2 Uninjured

After a local one-hour night flight the pilot was returning to the airport. At 1,000 feet agl, and four-and-a-half miles from the airport, the airplane experienced a loss of engine power. The pilot switched fuel tanks and went through the emergency checklist but was unable to gain a restart. The pilot landed hard in a landfill area and collided with a dirt bank during the landing roll. The fuel selector was found positioned to the right fuel tank, which had a small amount of fuel in it. About three to four gallons of fuel were found in a puddle underneath the right wing. The left wing tank had no fuel in it.

Probable Cause: Fuel starvation due to the pilot's inadequate inflight fuel management and his failure to select a tank containing fuel prior to the loss of power.

CESSNA 310K

Saugus, California

Injuries: 2 Fatal

The instrument-rated private pilot and two passengers were returning from the Reno Air Races where they had participated as pylon spotters. The destination airport was overcast with low stratus clouds. The pilot checked three mountain passes for a visual route into the coastal basin without success and diverted to an airport on the desert side of the coastal mountains for additional fuel and to file an IFR flight plan into the basin. One passenger chose to disembark and the pilot and remaining passenger departed. Recorded radar data and air-to-ground communications tapes between the airplane and the ATC facilities that worked the flight were obtained and disclosed that the pilot responded to heading and altitude instructions. While on vectors to intercept the destination ILS, the controller took the aircraft through the final approach twice for spacing with a preceding airplane. The Mode C report displayed a 6,000-foot altitude as the controller issued an instruction to reduce to final approach speed and then turn right to a new heading. The secondary beacon target began the right turn and radar contact was lost with the airplane. The last recorded Mode C report displayed 6,100 feet mean sea level. Witnesses near the impact site heard an airplane in the low overcast estimated to be 800 to 1,000 feet above ground level. The airplane sound was changing as though it were orbiting or turning. The witnesses then saw the airplane descending out of the clouds in a nose-down attitude. The airplane appeared to start a pullout when a noise was heard and the airplane tail appeared to break apart. Fragmented components of the tail assembly were recovered from various locations and distances from the wreckage site. Reconstruction of the wreckage found no abnormal conditions in either the aircraft structure or flight instruments.

Probable Cause: The pilot's inflight loss of control, which led to a subsequent structural airframe failure as the pilot exceeded the design stress limits of the airplane during an attempted recovery.

LAKE LA-4-250

Laconia, New Hampshire

Injuries: 1 Fatal, 1 Serious

The pilot/owner, sitting in the left seat, and flight instructor were on an instructional instrument flight. Shortly after takeoff, the airplane was seen trailing smoke. The smoke and engine noise stopped, then started again as the airplane leveled off, and began a left, 180-degree turn. The smoke and engine noise again stopped. Then the airplane descended, impacted a parking lot in a left-wing-down attitude and bounced through a snow bank and down a 15-foot embankment, onto a field. It then rolled upside down and caught on fire. A large hole was in the top of the engine crankcase, in line with a dislodged number four connecting rod. A hole in the bottom of the case was in line with a dislodged number five connecting rod. The number one connecting rod bearing and journal had light distress scoring in line with the oil supply hole. The number two connecting rod bearing and journal were normal, except for fire and heat damage to the bearing. The number three, four, five and six connecting rod journals had heavy distress scoring with extruded bearings. The injuries sustained by the pilot/owner precluded any recollection of the flight. He was not known to preheat the engine, and there were no witnesses to the airplane's preflight, start, run-up or takeoff. Outside air temperature was 23° Fahrenheit, and the airplane was stored in an unheated hangar. Recommended time between engine overhaul was 2,000 hours, or 12 years, whichever came first. The engine had in excess of 919 hours of operation, was built over 15 years earlier and had not had an overhaul.

Probable Cause: A loss of engine power during initial climb due to oil starvation. Contributing to the accident was the failure to perform an engine overhaul.

PIPER PA-18-150 SUPER CUB

Oxford, Connecticut

Injuries: 2 Uninjured

The pilot said he made a three-point landing, and during the landing roll the aircraft drastically veered to the right. He said he tried to correct with power, but the aircraft impacted a brushy area [and] veered off the right side of the runway down an embankment. Examination of the tailwheel revealed the right side tailwheel rudder spring was missing, while the left side was hanging and not connected. According to the airplane logbooks, the last annual inspection was completed on September 28, 1997. The airplane had accumulated over 6.5 hours since it was rebuilt in September 1997. Prior to the inspection, the last entry in the logbook was dated in 1981.

Probable Cause: The pilot's inability to maintain directional control during the landing roll due to separation of the tailwheel spring assembly. □

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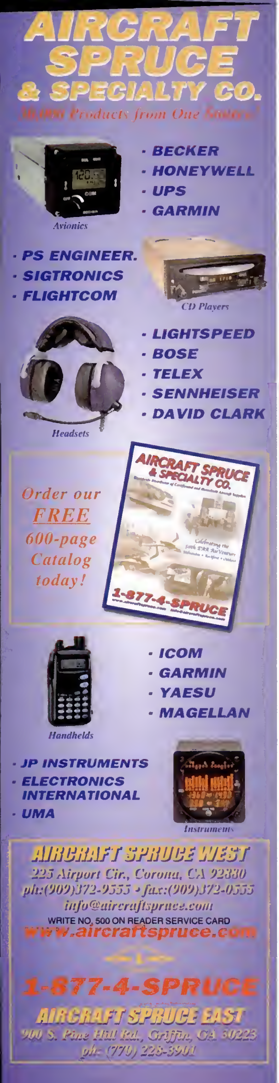
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Aftermath

By Peter Garrison

Ducking Under the Weather

Snow had fallen intermittently all Sunday at Tooele, Utah, at the south end of the Great Salt Lake. At 3:30 in the afternoon, 300 nm to the south at Mesquite, Nevada, the pilot of a King Air filed a VFR flight plan to Tooele, and, after having done so, asked for a weather briefing. The briefer gave him one airmet calling for occasional mixed icing in clouds and some mountain obscurement in central Utah, and another forecasting IFR conditions at the south end of the Great Salt Lake. Salt Lake City was already below VFR minimums. "You can make an IFR approach, I presume?" the briefer asked. "Yes sir," said the pilot, and the briefer commented "You need to."

The flight, with the pilot and eight passengers aboard, left Mesquite at 4:15. The pilot never activated the flight plan, and rather than use the Victor airways routing he had filed he flew direct to Tooele. When he arrived, the local weather, according to an instrument-rated private pilot who heard the King Air pass, was an indefinite ceiling with quarter-mile visibility in fog and haze. It was snowing and almost dark. The pilot described the sound of the King Air as half a mile from him, on the Tooele Airport runway extended centerline, and at pattern altitude or lower. He noted that the pitch of the propeller sound did not undergo the expected Doppler shift as the airplane passed him; rather it continued to rise, "as if they were in a dive."

Twenty-two miles northeast of Tooele, at Salt Lake City, the ceiling was 500 broken, 900 overcast, with surface visibility of a mile in light snow and mist. The wind was six knots.

At the Tooele Airport, which is about two miles from the water's edge, the airport manager and the husband of one of the King Air's passengers—they were all skydivers returning from a weekend meet at Mesquite—heard the airplane pass overhead. Radar tapes showed the flight crossing the airport at 7,700 feet msl, proceeding northbound over the lake, and then entering a descending left turn about five miles north of the airport. Radar contact was lost when the airplane was at 4,800 agl, 600 feet above the water. Its average rate of descent during the minute before the final radar hit was 2,000 fpm.

When the airplane failed to land at Tooele and was not heard from afterward, a search began. The first body was found after midnight, and duck hunters recovered various debris, including the pilot's logbook, early the following morning. The wreckage was in five feet of water, half a mile offshore, the airframe having largely disintegrated. Most of it was eventually recovered and examined by accident investigators. The engines and propellers gave no indication of failure; they appeared to have been delivering low to moderate power at impact.

None of the occupants' seat belts, including the pilot's, was fastened at the time of the accident, but the violence of the impact and the 20°F temperature of the water (which remained liquid because of its extreme salinity) would have made survival impossible in any case.

The pilot, 41, a 5,150-hour ATP and expert skydiver, was highly regarded by his friends and co-workers at the Salt Lake outdoor products company where he worked. The FAA found, however, that the accident flight involved some technical infractions. According to his logbook, he had not logged any instrument time in the past six months, and was therefore not legal to carry passengers in IMC. He had logged 1.2 hours of night flying in the past 90 days, but had not recorded the number of landings he had made (three are required for currency). Finally, his biennial flight review, dated about a year before the accident, had been performed in a Boeing 737 simulator; but since he was not rated for the type, it was not valid. He had, however, over 2,500 hours of turbine time, over

800 hours of night experience and 366 hours of instrument time.

The King Air, which had been configured for use as a jump plane, lacked passenger seats; the occupants sat on the floor on vinyl cushions, their seat belts secured to the seat rails. The airstair door had been replaced by a sliding door that could be opened in flight. According to the National Transportation Safety Board's report on the accident, the airplane had been stripped of all avionics except for a single transceiver and a handheld GPS. It evidently had a Mode C transponder as well.

Investigators interviewed people who had flown with the pilot before. One related an occasion on which the pilot, arriving above clouds, had descended over the Salt Lake City Vortac until he could see the ground, and then landed at Tooele. Presumably this was done with a clearance; the SLC Vortac is in Class B airspace, a short distance from the International Airport. Another reported the pilot's having descended over the lake in the vicinity of the accident site, and then navigated to Tooele "in deteriorating weather conditions."

The pilot's filing a flight plan to Tooele before getting a weather briefing, his flying direct rather than via airways and the high rate of descent before the impact, all suggest that he considered it a foregone conclusion that he would try to land at Tooele, and needed to hurry in order to arrive while he still had some daylight by which to slip below the clouds and find the runway. The airport would have been easy to locate once he had ground contact.

Instead, he descended into the water two-and-a-half miles from the threshold.

The NTSB decided that the probable cause of the accident was "the pilot's exercise of poor judgment and his failure to maintain a safe altitude/clearance above the water." Contributing factors were "the weather conditions that included low ceiling and visibility obscured by snow and mist, an inadequately equipped airplane for flying in instrument meteorological conditions, and the pilot's overconfidence in his personal ability in that he had reportedly done this on two previous occasions."

There is no mention of the pilot's having contacted anyone on the ground at Tooele on the unicom frequency to obtain the weather. If he listened to the ATIS for Salt Lake International, 22 nm

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east-northeast, he would have expected that a distinct and fairly high ceiling existed. That report could have led him to place too much reliance on visual cues, and not enough on instruments, while descending over the lake. Witness reports of the weather near Tooele at the time of the accident suggest, on the contrary, that there was no distinct ceiling, that visibility was very limited, and that a twilight gloom prevailed that would have made it difficult to discern the surface of water undisturbed by much wind.

The threshold of Runway 17 at Tooele is 70 feet above the lake surface, which is at 4,205 feet. A transmission line (whose height is unspecified on the sectional) runs near the shore. The lowest altitude to which a cautious pilot might reasonably descend over the water with the intention of returning to Tooele would be 4,500 feet; an especially bold one might drop down to 4,400, less than 150 feet above the runway, if he felt absolutely confident in the accuracy of his altimeter and certain that the ground or water would be clearly visible. But such a maneuver, in the absence of any usable instrument approach procedure, has obvious risks; many would not even consider trying it.

The NTSB report does not mention the aircraft's static system. The King Air would have been required to undergo a biannual transponder, altimeter and static system check. A static system leak could have caused the altimeter to read higher than the airplane really was, particularly if, as is likely, the sliding cabin door was not so well sealed as the original door had been.

It's tempting to comment that conditions for a visual approach could not have been worse unless the darkness had been total. But that would be wrong. In fact, total darkness would have been better, not worse, because it would have obliged the pilot to rely entirely on his instruments. As it was, the expectation that he would be able to see the surface probably diverted his attention from the altimeter.

The transition from instrument to visual flight is a critical phase of any instrument approach to minimums. The temptation is to go visual as soon as you have glimpsed the ground, whereas the wise thing to do is to remain on instruments right down to decision height. If it's tricky in a normal instrument approach, however, it's doubly so when the only navigational guidance is provided by a handheld GPS, and the pilot's scan, rather than merely being divided between the panel and the outside world, is still further fragmented. To this add the lack of redundancy in the stripped-down aircraft and the self-imposed pressure to get nine people back home on a Sunday evening, and you have a situation whose risks, doubtless unperceived by most of the passengers, are considerably greater than those of jumping out of an airplane.

This article is based solely on the National Transportation Safety Board's report of the accident and is intended to bring the issues raised to the attention of our readers. It is not intended to judge or to reach any definitive conclusions about the ability or capacity of any person, living or dead, or any aircraft or accessory. ☐

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The Leader In Recreational Aviation

Technicalities

By Peter Garrison

Refugee from Compromise

THERE ARE CERTAIN THINGS WE have always with us; the Bible mentions the poor, but believers in the ultimate superiority of flying wings are another, and almost equally persistent, category. Like devout knights bent upon finding the chalice used by Jesus at the Last Supper, they keep their eyes unblinking on the prize. Their Grail is a pure airplane consisting of a wing alone, uncluttered by any sinful excrescence: an immaculate temple of Lift.

Flying wings—a goofy name, really; "tailless aircraft" is better—are not merely an obsession of cranks, however. They appear periodically among the meditations of even such organizations as Boeing, which, in spite of a brief delusional period characterized by persistent repetition of the phrase "sonic cruiser," is on the whole crank-free. Giant transport planes consisting of nothing but wing are proposed; they are called "blended wings" or "spanloaders." The latter name hints at one of the characteristics that make them desirable. The idea is to lighten and simplify the airplane by putting the weight where the lift is, in the wing, rather than concentrating it in a slender tube at the middle.

This is a wonderfully simple idea, and like most simple ideas it is suspect. The fuselages of high-altitude airplanes are round not just to make them roll downhill better, but also because round is the natural shape of an inflated object. (When metal fatigue started showing up in the skins of old 747s, it was in the flat sides of the two-story portions that it appeared.) Pressurizing a wing is such a difficult structural problem that it would send designers scurrying after circular airfoils.

Other great names in aviation have had their flings with flying wings. We currently have, obviously, the Northrop Grumman B-2 bomber, thought by some to make up for the unjust fate of the magnificent YB-49 and other Jack Northrop flying wings of yore. Until recently we had the extraordinary 250-foot Helios, a featherweight sun-driven plank, propelled by 14 electric motors, that had climbed to nearly 100,000 feet. Sixty years ago the Germans had the Lippisch-designed Messerschmitt Me-162 Komet, the rocket-powered interceptor that was praised for its wonderfully docile flying qualities by those of its pilots who were not incinerated in fueling accidents. In the Fifties our Navy, briefly impressed with the possibilities of taillessness, was operating Vought F7U Cutlasses from carriers, and after them the ageless Douglas F4D Skyray—but that was a delta wing, and a slightly different story.

It is reasonable to wonder why, if airplanes can fly without tails, so many have them nevertheless; or, to put the question another way, if airplanes have tails in order to provide them with longitudinal stability, how can any airplane do without one? And why do we find long, high-aspect-ratio flying wings, like the YB-49, surprising-looking, while we take equally tailless narrow deltas, like Concorde, for granted?

I was traumatized at an early age by the unruly behavior of balsa wings when launched without fuselage and empennage. They are mere whirligigs, tumbling leading-edge-over-trailing all the way to the ground.

If I had been more persistent in my investigations—my laxity in such matters is but one of many reasons that my name shall not be inscribed among those of aviation's greats—I would have found that it is, in fact, possible to make a simple rectangle of balsa wood glide. You just have to weight its leading edge so that it balances a little ahead of its quarter-chord point, provide some sort of rear-mounted vertical fin and turn up part of the trailing edge. A little experimentation is necessary to discover the proper combination of nose weight and trailing edge flip; and then the simple wing will glide very creditably.

The upturn of the trailing edge is a hallmark of flying wings. When it is built into an airfoil it is called reflex, and it is needed to counter the so-called "negative pitching moment"—the tendency to tuck nose-under—that characterizes normally cambered airfoils.

Call the portion of the trailing edge that you have bent upward an elevator. Its function is to overcome the slight noseheaviness that you introduced with the weight. Now, the amount of noseheaviness is constant, since the weight and the location of the center of gravity don't change. The aerodynamic force on the elevator, on the other hand, varies with speed. The faster the wing goes, the more the elevator pushes down, lifting the nose, increasing lift, making the wing climb and thus slowing it down. The slower it goes, the less downward push there is on the trailing edge, and so the nose drops and the wing picks up speed. This is longitudinal stability; the wing seeks a certain angle of attack and returns to it after being disturbed.

When we apply this principle to a full-scale airplane, the first difficulty that arises is that the force that the elevator can produce is quite limited; for one thing, it is operating in the wake of the forward part of the wing, and for another it is close to the CG, and so has very little leverage. Consequently, the amount of noseheaviness that can be tolerated is quite limited as well. (No tailheaviness at all can be tolerated, by the way. Think it through: any tailheaviness would require an upward force at the trailing edge and a downward-deflected elevator—not an elevator at all, in fact, but a depressor. Increasing speed would then force the nose downward, pushing the speed higher and higher. Rather than return to its trimmed speed, the wing would diverge from it.)

Limited CG range can be a serious handicap of tailless airplanes with short chords—that is, ones with wings of conventional aspect ratio. The problem grows as the size and variety of potential payloads increase. To design a one- or two-seat flying wing for recreational use is easy, because its occupants can be put right on the CG; there their weight can change without altering the balance of the whole. But four seats in two rows present a problem; they can't *all* be on the CG. To handle a wider range of CG locations, you need an elevator with a longer lever arm than the wing's chord allows.

At this point, if you're not a zealot of taillessness, you just move the elevator two or three chord lengths aft, you add some structure to connect it to the wing, and you have a conventional airplane. But if you are resolute in wanting to avoid adding an empennage, you cast about for different solutions. One is to sweep the wings. This helps in two ways; wing sweep improves directional stability, and it allows you to put the elevators (and rudders) farther aft. If the elevators are at the tips of the wings, they may also serve as ailerons, and in that case are called elevons.

The most extreme instance of sweep increasing the leverage of the elevators is the delta configuration. The dominant dimension of the delta wing is its chord, not its span—its aspect ratio is less than one, in other words—and the elevators are far enough away from the center of lift to allow a fair amount of CG travel—provided that the CG always remains ahead of the center of lift.

A handicap afflicting deltas and flying wings in general is the limited maximum lift available for landing. Recall that most high-lift devices are variations upon the theme of deflecting a portion of the wing's trailing edge downward. But slowing the flying wing down requires raising the elevators, and so the effect is the opposite of that desired from landing flaps.

The impossibility of putting powerful flaps on a flying wing means that for a given landing speed, the wing area must be made quite a bit larger than if the wing had flaps. As the total surface area—the "wetted area"—of the airplane increases, so do the drag and weight. But reducing drag and weight was the whole point of the flying wing in the first place. It seems that we've strayed into the Realm of Compromise, where aeronautical engineers spend a large and vaguely unhappy portion of their lives. Above the gate is carved in dark letters, "Leave all hope, you who enter!"

Oh, no, I was mixed up—that's Hell. The Realm of Compromise is just a dull place, ruled by a committee, where the weather is always mild and partly cloudy. There flying wings acquire tails, supine pilots rise up and sit in chairs, and hawks are equipped with rotating beacons and fixed landing gear. It's where airplanes come from—except the ones called "uncompromising." Those are the ones we admire from afar, but hope that someone else will fly. ☐

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Jumpseat

By Les Abend

Borrowing a 757 for the Day

A HAZY WASHINGTON SKYLINE was just coming into view as we descended through 10,000 feet. The Washington Monument was the first landmark to catch my eye. National Airport was clearly visible just forward of the right wing.

I grinned at my copilot, tongue in my cheek. "Ask 'em for a visual. I got the airport in sight."

My copilot chuckled, nodding his head. "Sure. No problem." He pretended to key his mic. "My captain says he would like a visual. I'm sure you know who he is."

I smiled, looking at the line of airplanes ahead of us on the TCAS display. They were all in various stages of the River Visual Approach to Runway 19. We would have to be on fire with both engines flamed out in order to get ahead of everybody else.

For only a fleeting moment, I heard another voice. (Rest assured, I don't always hear voices.) It was the voice of a crusty old captain, long since retired. "Pretty nice of the company to let you use this airplane for the day, huh, kid?" I remembered having given that captain an obligatory nod, more out of respect than agreement.

It was a beautiful day for flying, and now here I was, thinking like a crusty old captain. When did I cross that line? I thought better of making the same statement to my copilot. He'd probably greet my comment with a roll of his eyes. I kept my thoughts to myself.

A flight to Washington National now involves some radio communication procedures that change each day. (As you would expect, I could tell you the procedures, but I'd have to kill you.) If we don't follow the procedures precisely we are given direct routing to Dulles. It's no joke. Some of our crews learned the hard way. If we don't proceed to Dulles, there is a good chance an F-16 will make the issue more persuasive.

Flight attendants are required to keep all passengers seated 30 minutes prior to touchdown and 30 minutes after departure. A passenger who exits his or her seat may be deemed a threat and dealt with accordingly.

The only other issue with a flight to Washington National is P-56. I don't think I have to say anything more about avoiding the place where the President lives. Unless you like paperwork, hearings and fines, it's best to avoid the most famous prohibited area in the country, notwithstanding the potential for dire consequences.

I am back to looking outside at a beautiful spring day. We are about to contact Potomac Approach. I glance at my copilot. He smiles, knowing my concern about the radio procedure. Just before he keys the mic, he feigns a perplexed expression, as though he is about to send us to Dulles. I listen to him contact Potomac Approach. He completes the radio procedure as required. I shake my head and smile at his wry humor.

We are vectored northwest of the city. I eye the Potomac River. As long as I stay over the river I can't get into trouble. I try to identify the landmarks on the approach before we are vectored to begin the procedure. The landmarks are not familiar. I'll have to use the DME distances as a crutch. The DME distances have recommended altitudes. I have already briefed my copilot that I will make use of them.

We are cleared to descend to 3,000 feet. I disconnect the autopilot and the autothrottles, enjoying the opportunity to hand-fly the airplane. We are given a turn southeast, positioning us over the Potomac. We are cleared for the River Visual Approach. My copilot helps me find the Naval Ship Research & Development Center. It's the first landmark at the beginning of the approach. The DME indicates 10 miles. My copilot sets 1,800 feet in the altitude window. I pull the power levers back about halfway to begin the descent. My copilot points out the Chain Bridge, the next step-down landmark. I look ahead for the Georgetown Reservoir, the 4 DME landmark. I have it in sight. Just prior to passing the Chain Bridge, the 6 DME point, my copilot rolls the numbers to 1,200 feet in the altitude window.

I attempt some brief sightseeing. With a quick look at the White House, I turn my attention to the threshold of Runway 19. We are just passing the 3 DME point, nearing the Roosevelt Memorial Bridge. According to the VASI, I am slightly high. A quick correction with the power levers and I am back on the glidepath.

I have slowed to our approach speed of 135 knots. I try to make the low altitude turn on to the final approach course gracefully. There isn't much room to maneuver. The gear is down. The flaps are in their final position at 30 degrees. We are cleared to land. The runway still looks short.

We're over the threshold as I begin the final stages of the flare. I float a little bit. I allow the airplane another 100 feet to touch down. It doesn't. I mutter a mild expletive under my breath as I bring the power levers rapidly toward the idle stops. The touchdown is firm but not uncomfortable. I roll my eyes at my performance while cracking the reverse levers rearward. The airplane decelerates quickly. I slide my feet to the top of the rudder pedals, applying the toe brakes as the nosewheel touches down. The end of the runway is not approaching as rapidly. We come to a rolling stop, exiting onto the parallel taxiway.

Our taxi instructions to the gate come quickly. We arrive at our concourse with our ground crew in position. I bring the airplane to a gentle stop at the moment the guideman crosses his orange wands. We start the parking checklist. With the checklist complete, I get up out of my seat. I reach for my uniform jacket, putting it on as I open the cockpit door. I take a step out the door, standing with my shoulder against the forward galley bulkhead. I put on my captain's face, nodding to the passengers as they deplane out the forward entry door. I smile, saying "Thank you" and "Take care."

With the last handful of passengers strolling up the aisle, I poke my head back into the cockpit. My copilot is throwing the last of the paperwork into the plastic trash bag.

"Lunch?" I ask.

He nods with a smile. "Sure."

Today is only a turnaround for us. We depart back to Miami in another two and a half hours. Lunch and an airplane ride. Not a bad way to spend the day. I keep my thoughts to myself again.

We stroll down the concourse, nodding to a couple of TSA agents as we pass security. I recommend Legal Seafoods for lunch. My copilot agrees. The waiter seats us outside. We take the opportunity to "passenger watch." My meal is delicious. We pay the check and begin our march through security to our concourse.

Upon reaching our gate, my copilot walks toward the jetbridge door while I punch in the code numbers to summon the elevator to take me to Operations. In Operations I call our dispatcher. After a brief reminder regarding DCA security procedures, the computer flight plan is unlocked. I enter the appropriate codes into the computer and the printer begins its noisy chatter as the flight plan information is automatically typed onto the perforated paper.

By the time I reach the airplane the boarding process has begun. I excuse my way past a few passengers standing by the forward entry door. My copilot is entering information into the flight management computer (FMC).

I take off my uniform jacket, hanging it up on the cockpit coat rack. I slide into my seat. We begin the litany of the Before Starting Engines checklist. The gate agent leans into the cockpit, asking if we are ready to go. I give her a thumbs up. She says goodbye to the number one flight attendant, closing the forward entry door with a solid thump of the handle.

With the completion of the final checklist items, my copilot calls ground control for the pushback clearance. I have released the brakes, as requested by the tug driver. We roll backward with a clearance to start the engines. At the completion of the engine starts, the tug driver calls for the brakes to be reparked. I give him permission to disconnect the towbar and his headset. Another ground crewmember displays the orange flag of the steering pin, indicating that nosewheel steering is available and the area is clear of men and equipment. I watch the tug move backwards with the towbar still attached. It chugs toward the gate in its usual awkward, lumbering motion. The remaining two men of the ground crew hop on opposite sides of the tug, hitching a ride back to the gate.

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Washington ground control gives us a clearance to taxi to Runway 19. Just before we are to hold short of a crossing runway, we are given a twist. The wind has shifted. The airport has to be "turned around." We are given a 180-degree turn and told to expect a Runway 1 departure. My copilot winces. He's got some computer work to do on the FMC. We both have to review a northbound departure procedure. The procedure requires an immediate left turn at 300 feet in order to intercept the Potomac River. We are required to track over the river until 10 DME. At the 10 DME point we are to intercept the DCA 328 radial, unless otherwise instructed by ATC. In case of an engine failure we are to turn left at the .4 DME point and then intercept the DCA 341-degree radial. We are then required to turn left to a 310-degree heading at 2.6 DME. At that point, ATC expects us to take our engine failure to Dulles and not back to Washington National. I quietly hope my brain will go into overdrive at the right moment.

Before completing the review of the new departure procedures, we are given a clearance to taxi to Runway 1. Ground control has us switch to tower frequency. We are asked if we will be ready upon reaching the departure threshold. I look at the mechanical Before Takeoff checklist. A few more items remain. I look at my copilot. His fingers are still dancing on the buttons of the FMC.

"Tell him we need another minute and a half," I say, while watching my copilot shuffle his Jepp pages.

My copilot nods with a relieved expression, keying his mic. "We need a minute and a half, Wash."

"Roger. Advise when ready." The tower's reply reveals no irritation.

With the takeoff briefing and the checklist complete, we are ready in less than a minute. We are given a takeoff clearance almost immediately. I line up on the runway.

"You've got the airplane on the roll," I say to my copilot as I pat the power lever knobs. He grips the power levers, moving them to the obligatory straight up and down position. He waits for the two Rolls-Royce engines to spool up together. With the engine indications looking normal, he pushes the power levers further, matching the EPR needles with the green takeoff bugs. We accelerate with the sight of the Washington Monument in full view.

The takeoff is smooth. At precisely 300 feet my copilot banks the airplane to the left, following the direction of the Potomac River. Within a minute we are climbing through 2,000 feet. Upon contact with Departure Control, we are given a right turn, southeast bound.

The time goes quickly. We find ourselves at cruise altitude, making an assessment of lunch. We officially rate both our meals with a thumbs-up. We move on to other subjects. As the conversation continues, I realize that not every trip runs this smoothly. I just forget to appreciate the trips that do. I have to remind myself that I started this career because I love to fly airplanes. My trip to Washington was a good reminder.

I glanced at my copilot. He was peering out the forward windscreen, his elbows perched on the glareshield. He was sightseeing, a faint grin etched on his face. Perhaps I should ask him how he liked borrowing the airplane for the day? Naaah. ... I'll keep it to myself. ☐

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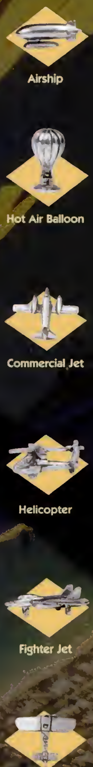

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Flying Lessons

By Lane Wallace

The Hours that Count

IT WAS SUPPOSED TO BE SUCH AN EASY flight. Oh, there was some weather that was supposed to move in that evening, but I'd called Flight Service *five minutes* before leaving for the airport, and they'd told me it was clear below 12,000 feet, with 10 miles visibility all along my route. And forecast to stay that way the rest of the afternoon.

So, okay. The Livermore Airport, where the Cheetah is living at the moment, *is* a 45-minute drive away from my house. And I needed fuel, so it was probably another half hour after that before I was wheels up. And the Salinas Valley, which I was following on my way down to Santa Ynez, is probably another half hour's flight from Livermore. So as much as a couple of hours could have transpired from when I talked to Flight Service and the point when I decided that their forecast must have applied to a parallel universe in some other, more benign, weather dimension.

As I headed south from Salinas, I couldn't help but notice some really dark, nasty-looking gray stuff ahead that looked an awful lot like a ragged ceiling ... a whole lot lower than 12,000 feet. To be exact, the clouds were lingering at about half that altitude—or about 500 feet over my canopy. In order for the "clear" part of the forecast to be accurate, you'd have to make a judge's ruling that clear *rain*, falling on the canopy, still fits under that category. As for the 10 miles ... well, heck. Ten ... four ... What's a few miles between friends?

If I knew this particular set of ridgelines and valleys well, it might not have been a big deal. But I'd never actually flown this route before, and I had to thread my way through a couple of different valleys to make my way down to Santa Ynez at that altitude. I had my GPS dialed in, and I backed up my confidence about my exact location and distance from the ridges surrounding me with a finger plunked firmly down on the sectional spread out across my knees. I peered into the gray skies ahead, wondering if that dark patch lurking around my altitude a few miles down the road was a cloud or ridge, even as a piece of my brain recognized that "Is that a cloud or a ridge?" isn't really a question you want to be asking in your airplane.

ATC called me out as traffic to a Cessna 210 descending through 7,000 feet, only to have the 210 pilot reply in a curt tone of voice that they were in the clouds and couldn't see anything. Another pilot a handful of miles behind me called up right after that asking for weather conditions down the road, because both the visibility and ceiling were deteriorating where he was. Center asked if he wanted to file an instrument flight plan. "I'm VFR only," came the tense reply.

I shook my head as I scanned the clouds for the descending 210 that was supposed to pop out at any time now. Apparently *nobody* was having a good day out there today.

Nevertheless, an hour and a half later I'd found my way beneath the clouds and through the mist, rain and a couple of valleys down to Santa Ynez, where I parked the airplane and headed for the nearest bar. As I recounted my flight to a friend, he smiled and said, "Well, Lane, that kind of flight builds character, you know."

Among the unhelpful comments of the world, "Well, that kind of thing builds character" rates right up there with "Well, other people have it a lot worse," and the perennial favorite, "I told you so."

"You know," I answered with a slight edge, "I've had a ton of character-building hours in that airplane. I don't think I really need any more."

Unruffled, my friend just laughed. "Ah, now *there's* the hours they should really track in our logbooks," he said with a grin. "Wonder why nobody's ever thought of that."

Why, indeed? I have a very nice, new logbook that has columns for flight training hours, solo or pilot-in-command hours, cross-country hours, instrument hours, simulated instrument hours, night hours, single engine, multiengine and "other" type of aircraft hours. But my friend was right. What it really needs is a column that would tally the flight time that's really taught me the most and made the biggest difference in my flying skills—those memorable, adrenaline-packed and wildly uncomfortable but instructive "character building" hours.

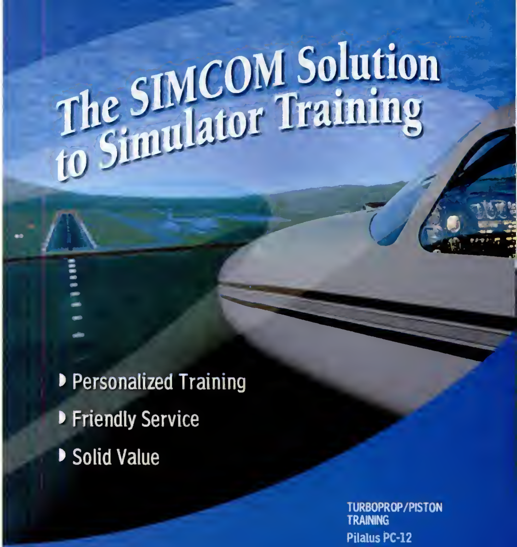
Of course, since every second seems like an eternity in the midst of any character-building flying experience, I think each minute should count as an hour. After all, I've certainly learned more in 20 character-building minutes than I have in 20 hours of calm, uneventful, straight-and-level flying.

There was, for example, a recent flight with my friend Jeff back from Redmond, Oregon, where I'd dropped the Cheetah off for its annual. We were in a rented Arrow, returning to Livermore Airport on a beautiful, cloudless, spring afternoon. We diverted slightly to fly over Crater Lake, which was stunning in its snow-rimmed serenity, the late afternoon sunlight sparkling off its deep and crystal waters. We then happily wound our way down past Mount Shasta and the northern California ridgelines in the golden evening light before crossing the Sacramento River Basin just as dusk darkened the hillsides east of Mount Diablo. All was good and right with the world, and the GPS put us a mere seven and a half minutes out from Livermore. In 15 minutes, we would be on the ground, airplane tied down, and headed to a good dinner.

Then Jeff glanced down and saw the oil pressure gauge dropping precipitously from the middle of the green arc to the very bottom of the red arc. The oil temperature wasn't climbing—at least not yet—but for all we knew, we could have a circulation problem with the oil that could make the engine seize without showing a noticeable increase in oil temp. Seven and a half minutes away from safety. But we were over hostile, hilly terrain, and we couldn't even make out the hilltops and valleys clearly in the deepening dusk. That seven and a half minutes might be five minutes too many if our problem was something more serious than a gauge malfunction.

What to do? We'd been about to start our descent for the airport, but after a quick discussion, we decided to keep our 5,500 feet, keep the throttle exactly where it was and abandon the straight path to the airport, which would take us over dark and rough terrain, for a more square approach that would take a few minutes longer but would let us fly over flatter terrain, where we'd at least have a road underneath us. Jeff called the tower and asked for priority handling as we crossed our fingers and headed for the airport, anxious eyes alternating between the engine gauges and peering into the dusk for possible landing sites all along the way.

Fortunately, the engine kept running, and the oil pressure even came up a bit on short final, as Jeff gunned the engine a little to compensate for some unexpected sink. We tied the airplane down and headed for that long-anticipated dinner, but dinner conversation was focused on an intense debrief of those last seven minutes of flight and what we'd learned for next time. It was clear that we'd benefited from each other's presence, because Jeff hadn't thought about



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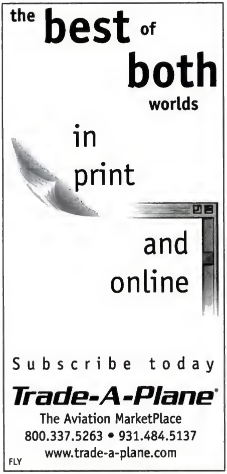

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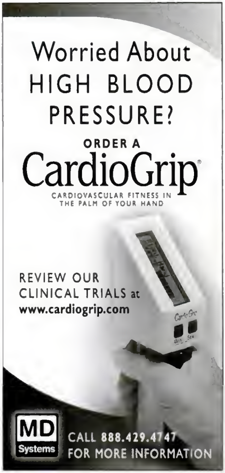

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leaving the throttle at cruise power until the field was made, and I hadn't thought about taking the longer course to the runway in order to stay above better landing sites. But neither one of us will ever forget those tips if we find ourselves in that kind of situation again. We were also highly motivated, in the days that followed, to learn more than we ever otherwise would have about the potential causes of a dropping oil pressure gauge.

Definitely worth at least seven character-building hours in the logbook.

Then there was the time I allowed myself to get bullied by a Pensacola, Florida, controller into going three miles out to sea, in three-mile visibility, with a lowering ceiling that eventually drove me down to 600 feet above the ocean to stay out of the clouds. I explained my situation to the controller and asked twice for permission to come closer to shore, where the ceiling was higher. But the controller curtly denied me both times, saying he had F-14s to worry about, even though he allowed a Beech Duke to transition along the same shoreline route that I was requesting permission to follow.

Those interminable minutes over the ocean until I was finally allowed to contact a more cooperative Eglin AFB controller were certainly character-building. And I won't soon forget the lessons they taught me. What *was* I thinking, allowing a ground-bound controller to put me in such a spot? At the time, I decided that 500 feet was going to be my bottom line. If I had to go any lower, I was going to declare an emergency and just head to shore. But if I had to do it over again, I wouldn't have waited that long. I would've informed the Pensacola controller in a similarly curt tone of voice that I was unable to continue safely three miles offshore, and that he could either allow me to come closer to shore, or I'd declare an emergency and just head there on my own and we could sort it all out on the ground.

I also remember realizing at the time that much of my anxiety was stemming not from where I *was*, but from what I was afraid might happen a few miles into the future. As I constantly evaluated my less-than-ideal situation over the ocean, I kept asking myself, "Are you okay right now?" I considered the fact that I was clear of clouds, under control, wings level, in a perfectly working airplane, over an ocean I could see clearly with no obstructions, with both GPS and VOR and at least the faint outline of a shoreline for guidance. Not good, but not an immediate emergency, either. I just had to watch carefully to see how things progressed and be ready to make an immediate change if necessary.

In retrospect, I learned more about weather, assertiveness and staying calm in a challenging flight situation in those 15 or 20 minutes over the ocean than in weeks or months of easy, local flying time. So I could probably chalk up at least 20 character-building hours for that one.

In a perfect world, of course, we'd all learn all our lessons the first time around, or from a nice, neat textbook or instructor. We wouldn't allow ourselves to get bullied by an irritated controller, reduce power on a potentially ailing engine before the field was made, or stray further into worsening weather than, in retrospect, we probably should have. We'd also develop all the wisdom and character we need to lead truly happy, grounded, fulfilling lives without making any mistakes in our relationship choices or walking two miles down a career or life path before realizing it wasn't the one we really should have taken.

Unfortunately, few of us are that perfect. And so much of our important learning ends up occurring through the painful but effective school of experience—of doubling back, trying different paths, and muddling through the worst parts as best we can. It's a lot messier that way, of course. But I think sometimes it's by working our way through the more challenging and imperfect situations of our lives—in the air or on the ground—that we find ourselves learning the most. Assuming, of course, that we're open to the learning. But that's a different topic.

Meanwhile, I think the logbook companies should seriously consider revamping their designs to include space on the pages for those all-important "character-building" hours we all experience. For no matter how many chronological flight hours we accumulate, it's the character-building ones that really stretch us, challenge us, give us unforgettable gifts of experience and knowledge and, in the end, teach us as much about ourselves as they do about flying. ☐

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104	AEROSPECTIVES, CORPORATION	780
10	AIR BP	766
88	AIRCRAFT SPRUCE & SPECIALTY	500
5	AIRLINE TRANSPORT PROFESSIONALS	503
110	AIRLINE TRANSPORT PROFESSIONALS	729
80	AIRMAN FLIGHT SCHOOL	511
29	AVEMCO	660
12	AVIATOR	
39	AVIDYNE	748
18	AVIONICS INNOVATIONS	772
108	BE A PILOT	
43	BOSE	
C4	CESSNA AIRCRAFT	535
69	CHALLENGE AIR	
23	CHELTON FLIGHT SYSTEMS	740
52	CIRRUS DESIGN	779
28	CORPORATE ANGEL NETWORK	
C2	DASSAULT FALCON JET	
14	DAVID CLARK COMPANY	556
58	DELTA CONNECTION ACADEMY, INC.	756
6	DIAMOND AIRCRAFT INDUSTRIES, INC.	749
51	EXPERIMENTAL AIRCRAFT ASSOCIATION COUNTDOWN TO KITTYHAWK	
91	EXPERIMENTAL AIRCRAFT ASSOCIATION MEMBERSHIP	
19	EMBRY-RIDDLE AERONAUTICAL UNIVERSITY	776
93	EMBRY-RIDDLE AERONAUTICAL UNIVERSITY/ DISTANCE LEARNING	538
47	FLIGHTSAFETY INTERNATIONAL	778
110	FLIGHTSAFETY INTERNATIONAL	
20	FLYING EDGE	
24-25	FLYING MAGAZINE AT YOUR LOCAL FBO	
35	FORD MOTOR COMPANY/JAGUAR	766
C3	FORD MOTOR COMPANY/EXPEDITION	
16	GARMIN INTERNATIONAL, INC.	690
15	GULFSTREAM ACADEMY OF AERONAUTICS	515
30	JEPPESEN SANDERSON, INC.	566
61	JEPPESEN SANDERSON, INC.	692
2-3	KING SCHOOLS	
45	LANCAIR INTERNATIONAL, INC.	773
56	LASERGRADE	526
95	LIBERTY AEROSPACE, INC.	645
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48	PILOT INSURANCE CENTER	524
80	RAYTHEON AIRCRAFT	
61	RAYTHEON AIRCRAFT	
11	ROCKWELL COLLINS	545
31	RYAN INTERNATIONAL CORPORATION	562
54	SHEFFIELD SCHOOL OF AERONAUTICS	
77	SIERRA ACADEMY OF AERONAUTICS	
99	SIMCOM TRAINING CENTERS	522
13	SINO SWEARINGEN AIRCRAFT	564
32	SOCATA AIRCRAFT	759
89	SOUTHEASTERN FLIGHT SCHOOL	526
87	SPARTAN SCHOOL OF AERONAUTICS	588
4	SPORTY'S PILOT SHOP	640
4	SPORTY'S PILOT SHOP	641
7	SPORTY'S PILOT SHOP	763
57	SPORTY'S PILOT SHOP	595
57	SPORTY'S PILOT SHOP	642
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97	USAOPOLY	
12	WEATHERTOOLS.COM	569
22	WESTWIND SCHOOL OF AERONAUTICS	541
85	WORLD OF WINGS	762

Gear Up

By Dick Karl

Things an Airliner Can Do That I Can't

THERE ARE SEVERAL GOOD REASONS for airplanes, but I am still and often happily amazed by their ability to carry me long distances in comfort and at great speed. This characteristic of aircraft is most enjoyable when I'm at the controls, but I still enjoy a good airline trip when the distances call for more speed, altitude and safety than I can afford for myself. I have often wondered if the Wrights had any idea about the practical value of their experimental efforts. They were drawn by the challenge, certainly, but did they ever imagine that 400 people could go nonstop from New York to Tokyo less than 80 years after they went 120 feet? For that matter, did Charles Lindbergh, even when he was a director of Pan Am, really understand the profound change in the way the world works that he provoked by piloting his airplane alone from New York to Paris?

Last spring my wife and I turned in some Delta mileage points and headed to Italy at a cost of $22 per person. To make things even better, we turned in some American Express points in the Starwoods hotel program and arranged for a week's worth of free night stays. Getting seats using mileage points on the airlines is an art in itself, and I claim no special expertise in these matters. Several readers could teach me a great deal, I am sure. Delta offers a free round trip from the States to Europe in its Business Elite class for 80,000 mileage points, but it is almost impossible to travel on the dates of your choice. For double the miles, they'll pretty much give you what you want. We were lucky because we got the trip for the lower rate by calling almost daily for a few weeks in March for travel in May. Beggars can't be choosers though, and our itinerary involved flights from Tampa to Kennedy in New York, to Brussels on a Delta 767-300, then flights on Alitalia to Rome and finally Florence. The return trip was Rome-Brussels-Kennedy-Tampa, a long day even on jet equipment.

We arrive at the Delta counter in Tampa on the Friday before Memorial Day at 1 p.m. for a 2 p.m. departure. Check in takes just a few minutes, and our bags are whipped onto the conveyor belt and down the chute seconds later. We are through security in less than 10 minutes and get to the gate a good 40 minutes before departure, only to find that there is no airplane at the gate and an electric sign says that our departure is now 2:40. We hear some commotion and drift over to a small crowd gathered around a temporary stage. The new president of Song, Delta's new low-cost carrier entry, is in town with one of his newly painted 757s and he's giving expensive wooden models of the airplane to some local dignitaries. Song is to start up service out of Tampa early the next morning with a trip to New York. Our Delta Express equipment arrives late, and we're soon told that it has a mechanical problem and that we're probably going to leave around 4 o'clock. Several passengers are connecting to Europe in New York, and this news causes a minor frenzy on their part.

I spot our first officer eating an ice cream cone and he tells me that the problem is a stuck squat switch that refuses to signal to the airplane that the gear is retracted. Rebooking gets difficult as the terminal is now awash in a torrent of reggae music played by a band hired to celebrate the inauguration of Song. I guess Delta still has some spare change hanging around to pay for entertainment. As the band plays a song about Song, we strain to hear the announcements about where to go to check on our trip. When the music pauses, the gate agent announces that we're going to take the new Song airplane to New York. She thanks the Song president for "lending us his airplane." We're now scheduled to depart at 3 o'clock, and everybody should make his or her connection.

In fact, the new Song president, John

■ Song Airlines' Boeing 757-200 on arrival at JFK

PHOTO: SENGA BUTTS

Selvaggio, comes on the 757, shakes some hands, tells us it is a good airplane and admonishes us to send it back so it can start service in the morning. We're off by 3:15 and climb only to 28,000 over and around clouds and thunderstorms. The Song plane looks like an Ian Schrager hotel. The seats are blue with purple and pink trim. The bulkhead in front of us is loud chartreuse. There is a modest beverage service, and the flight attendants, who will wear much more fashionable outfits starting tomorrow, have not yet begun their jokes and repartee that are reported to be like those on Southwest.

We land on 31Left at Kennedy, which leaves us close to the Delta gates, and everybody has plenty of time for connections. We go to the Business Elite lounge, enjoy a few sandwiches with the crusts cut off and watch a few families preparing to take young children across a big ocean. Once boarded, the crew of our airplane is an upbeat bunch and they welcome me in the cockpit. They check to see that 97,000 pounds of gas has been loaded on.

We push back on time and taxi out for what should be a six plus 31 trip. We're soon number one for takeoff on 31L, Canarsie climb, Merritt transition and up to 5,000 according to what the boys told me before I had to sit down and drink champagne. Sure enough, the "Airshow" moving map mounted just in front of us scrawls an elegant loop over Long Island and on to Connecticut (home of the Merritt Parkway, hence the name of the transition). By the time I've picked veal chop for dinner, we're at 35,000 and heading for St. Johns, where we'll coast out.

We fall asleep after dinner and when I wake it is already light. This one fact has always arrested my attention: we leave in the light, fly through the night and into the oncoming sun, light to light, without ever landing. Transport pilots tell me that the bright sunrise high over the Atlantic or Pacific is a blinding disincentive to long-distance overwater work. The pay's good, though, they agree. Or was. The "Airshow" says we're over Ireland, but all I can see is a low cloud deck. We have a little breakfast, get ready to land and feel tired. Our six hour 31 minutes goes by as we sail over Brussels and head west before turning back around for a landing to the east. At 3,000 feet, we're still above a cloud deck and it looks like an ILS is in the offing. Sure enough, we're only a few hundred feet in the air when I can see the ground and I guess the RVR to be 2,200 feet or less. Tired as they must be, the crew nails the approach and landing, and we're on 15 minutes late.

The Brussels Airport is new and befits a city that is the new European Union capital. We walk and ride moving sidewalks for what seems like almost a mile before we're at the luggage carousels and the bags aren't there yet. It is cool and rainy, and after a nap we enjoy a great night and a good meal.

Next day we're back at the new and impressive terminal to board an Alitalia Airbus 321 to Rome. We're given business class seats, which makes us smile. These seats are in the front of the airplane and they are wider than the coach seats, but they're still three abreast. This means that the middle seat is ludicrously narrow—maybe six inches wide between armrests—but still features its own seat belt. Maybe you could put half a baby in there. There is no boarding by

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rows, and the Italians attack the boarding process with gusto, giving us a taste of another culture.

The hour-and-a-half flight goes smoothly at 33,000, and once south of the cloud cover, we get an excellent view of the Alps, which have served to separate the cultures of Europe for centuries. Our arrival into Rome Fumicino Airport is on time and we're full of lunch and Asti-Spumanti, which is good because we've got a few hours before the short flight to Florence.

I'm hoping for a turboprop and after we board a bus that circumvents much of the airport we pull up to an ATR 72, giving me great pleasure. Alitalia Express has several ATRs, and it seems that no two of them have the same propeller arrangement. We're on one with at least six blades a side. There is a delay as we wait for a passenger, but we fire up number two and taxi out just 15 minutes late. As we're cleared onto an active runway at an intersection ahead of a Delta MD-11 carrying troops or their mail back to the States, the second engine spools up and we're off. We climb to about 18,000 feet, I'm guessing, and turn out over the Mediterranean Sea on a clear hot day. We track just up the west coast of Italy until we get to Pisa, when we turn east toward Florence. Once we start down we take one obvious turn in the hold—the Med comes back around into sight and then disappears to our left again. Soon we're maneuvering amongst the hills that surround Florence and then we start a steep descent toward what I hope is an airport. Sure enough, some runway appears out of the window, the power comes back, and the nose comes up. Next we experience what every pilot dreads. The nose comes up. And up. The speed bleeds off and yet we're still six feet off the ground. Then the sink rate starts to accelerate, the nose comes up some more and that old familiar sinking feeling is now very clear. As the saying goes, we are about to run out of runway, airspeed and ideas, all at the same time. WHAM, we're down. The engines roar into beta and we turn off at the end. We park close to the small terminal and the pilots wait until everybody is inside before they show their faces.

This isn't a travel magazine, so I'll leave the wonders of Italy to other writers, but I will point out that getting a martini in Europe can be an adventure, as "martini" means that sweet vermouth. Nonetheless, I can send you to the Excelsior Hotel in Florence with instructions to look for Mario. He knows his business.

Five days later we travel by train to Rome, have dinner with an Italian friend at a very "in" restaurant, and get up early to catch the 9:40 to Brussels. No need to bother, though, because one of the flight attendants has called in sick and we're left just waiting for a substitute. As an hour goes by and our connection time narrows to zero in Brussels, the crowd gets restive. We finally board at 10:10 and then sit, waiting inexplicably.

We're finally airborne at 11 and scheduled to arrive in Brussels at the other end of the other very long terminal at one o'clock. Our Delta flight to Kennedy is supposed to leave at 1:20. Once on the ground it seems like hours before the jetway is hooked up and we bolt off the airplane. We sprint down one terminal, down the escalators to the underground walkway, up the escalators and then come to an abrupt halt as a few first-time travelers learn about airport screening. Once through the screening process, we've still got a pretty good run ahead of us and I see an American Airlines 767 surrounded by fire trucks on the apron.

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On closer inspection, made while still jogging, it appears as if the plugs have blown and the airplane is sitting on eight flat tires. Sure enough, we run past a sullen looking group of American passengers who have been returned to the gate.

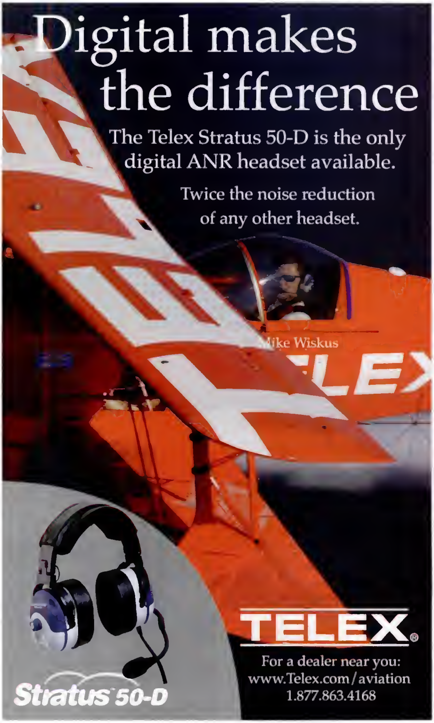
Delta has kindly waited for us, and, in fact, they now wait another 35 minutes for all the connecting passengers and their luggage to arrive from the Alitalia flight. I spend the time visiting up front. These bright-eyed pilots are finishing a six-day trip (New York-Rome; Rome-Atlanta; Atlanta-Brussels; Brussels-New York). Captain James Kenney tells me that we've got 110,000 pounds of gas and that the time en route should be seven plus 21, close to an hour longer than the trip over. This reminds me that even the big boys are not immune to headwinds. We'll weigh 375,000 on takeoff, well short of the 409,000 maximum taxi out weight. The boys tell me that the American guy aborted on takeoff and then taxied back in "on the rims," so they might be there for a while. There is no gloating in these remarks, just professional observation.

The meal is good, the flight smooth and, all in all, it has been a great vacation. Many readers may go to Europe or Asia several times a year, and others may have never been. I've been lucky: I've had a chance to do both several times. I don't feel very jaded, though. I still get sleepless the night before such a grand adventure. The whole concept of traveling such great distances in such lucky comfort still arrests my senses. My friend JC, who used to fly Northwest 747s between New York and Tokyo, tells me that sometimes, after landing, he'd walk under that big airplane and just be astounded that he'd been entrusted with those lives and that equipment for a trip halfway around the world.

We land on time in a cool rain at Kennedy and deplane through a dingy arrival facility that is reminiscent of a third world country. Short-tempered U.S. Customs agents shout, "Wake up people. There are two lines," in a harsh New York accent. Welcome home.

We board Song, which is now Song for real, and we're home by 9 in the evening, just a short 19 hours since starting out in Rome. Our dog, Ubu, greets us and we fall into bed, exhausted and very acutely aware of how lucky we are to have flown to a different culture and arrived back home, right on schedule.

I know that airline travel is not what it used to be. I know that being an airline pilot is different, too. But the basic wonder of it all has not changed. We've grown accustomed to comfortable travel over long distances. As an old friend of mine, a first officer for American Airlines, once told me: "You know, in the winter we'd leave Chicago after dark, take off into gusting winds in snow, fly over some of the most inhospitable parts of the earth, and arrive in Paris where the winter weather often meant very low visibilities. After landing, the visibility would be so poor that we'd have to wait for the 'follow-me truck' to lead us to a gate. As I'd stand in the cockpit door, a deplaning passenger would say to me, 'Your food is terrible.'" I've always held his story in my head whenever I've traveled abroad and I have vowed to never stalk grimly down the jetway into another world without pausing to let the magnificence of it all sink in. ☐



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I Learned About Flying From That

By Peter E. Laurin

No. 759

Summer Float Flying: Beware of Hot, Humid Weather

THE TASK SOUNDED SIMPLE: FLY five adults to Devils Lake for a day of fishing. Pick them up before dark with their day's catch and bring them back to base. Yet of all the flying I have done (at last count my logbook showed more than 5,000 hours and 12 different aircraft types, including everything from Cessna 152s to F-18s), this is my story of "I Learned About Flying From That."

I was flying a C-185 floatplane in Barry's Bay Ontario, in 1985. Devils Lake was our favorite fishing hole. It was the roundest and smallest of all the lakes we took our customers to, but it had the best fishing.

Landing there was never easy; it was always glassy water, and a pilot had absolutely no room to land long. Taking off was worse; you had to taxi into the weeds to give yourself enough room to get airborne and clear the 40-foot spruce trees at the end of the lake. Did I mention the winds, how about calm winds ... all the time.

My passengers that day were an ex-World War II bomber pilot, his wife, son, daughter and her husband. I took them in two groups due to weight concerns. The bomber pilot was very large and had to hold his stomach in with his hands so that I could have full use of the yoke/elevators. Needless to say, he sat up front for weight and balance considerations.

The morning trips in to Devils Lake were uneventful. The weather was perfect but rather hot and humid, with light winds. The light winds resulted in glassy water landings, but I was well practiced at these.

At approximately 4 p.m. I flew back to Devils Lake to pick up my passengers. My first load consisted of the bomber pilot, his daughter and her husband, a collapsible boat, a small outboard motor and some fish. My first takeoff was aborted as I could tell that the aircraft was not getting on the step quickly enough to get airborne in time. Despite leaving the boat behind, I had to abort my second takeoff for the same reason, not stepping up quickly enough, as we like to say in the business.

Attempt number three was going to be the one in my mind. I left behind the outboard motor and the fish; I pumped out the floats to bone dry and took only the three passengers. I taxied into the shallowest of water to give myself every possible inch of lake to take off from. As I turned toward the middle of the lake, I went full power so that the instant I was

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aligned for takeoff the engine would be operating at maximum horsepower. The acceleration felt good, and I was quickly planing. I lifted one float out of the water to reduce all possible drag. We were now committed to take off or crash, as the decision to go or not to go had to be made as soon as you were on the step.

Airborne! Even if only in ground effect, we were airborne in plenty of time to clear all obstacles. Then the unthinkable happened; as soon as I tried to climb out of ground effect, we sank back on to the lake! I immediately cut off the engine, dropped the water rudders and dropped full flap. With the water rudders down, I tried to do some fishtailing. I had to make the airplane come off the step to slow our collision with the shore and the trees.

Then I saw it. I had seen it before but never considered it usable. A shallow creek fed into the lake, and it was coming up fast. Was it deep enough? I had no idea. I was not even sure if my wings would clear the trees on either side at the mouth of the creek. Before I completed that thought we were past the trees and going up the winding creek like a rocket.

Only the laws of physics and aerodynamics were going to stop this floatplane, or, wouldn't you know it, a beaver dam! As we came around a bend in the creek, a beaver dam appeared dead ahead, blocking the entire creek. We were going to ram it. All of my schooling, flying, effort and luck was about to end due to the handiwork of a family of eager beavers.

God must have been smiling or possibly laughing at this point and decided enough was enough, because 30 feet before impact the floatplane came off the step. Once a floatplane stops planing it will come to a complete stop in a matter of feet, and it did. No crash, no smash, no damage and, most important, nobody hurt. I simply looked over at the wide-eyed bomber pilot still holding his stomach in and said, "Sorry." He never responded, and, in fact, I don't recall him talking to me again, ever.

I jumped into the waist deep creek to pivot the aircraft around, as it was not wide enough to taxi turn. Once pointed in the other direction, I tried to start the engine, which, with three aborted takeoffs, was overheating. I eventually started the engine and taxied all passengers back to shore to await sunset, cooler temperatures and better takeoff conditions.

Sunset arrived and it was decided that I would fly out only the daughter and her

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I was certain I had only enough battery power to try one more start. With that in mind I decided to paddle the floatplane to the middle of the lake. The son had volunteered to bring his sister and her husband to the airplane by boat. I noticed he had been drinking but thought nothing of it at the time.

There we were, the daughter, her husband and I, ready for takeoff. I had all the switches set and was waiting and watching the son drive the boat back to shore. I noticed he was steering from the wrong side and had a beer in his other hand. He was well clear of us when I started the floatplane, but I then noticed the boat starting a sharp turn. The son had lost control of the boat and had lost his balance. The boat had suddenly turned 180 degrees and was headed straight toward us. I desperately tried to turn but could not avoid the oncoming boat. I had no choice but to shut down the engine.

What I saw next sent a chill down my spine. The son was going between my floats with his arms up trying to protect his body and head from my turning propeller. I quickly opened my door, dreading what I might see. Miraculously, the son was unhurt. He had leaned over the back end of the boat and avoided the propeller by one foot.

Now what to do? My battery was essentially dead. My base would surely think I had crashed, as had happened a few summers ago to another pilot. We all headed back to shore to spend the night. I opened my VFR supplement and built a signal fire for the arrival of the Search and Rescue (SAR) helicopter. I decided to sleep in the floatplane to welcome our rescuers. All others slept in the cabin.

Around midnight I was dreaming and hearing these words "Peter, Peter." As I came to, I realized the words weren't "Peter, Peter," but, "They're here, they're here." There, hovering 200 feet away at an altitude of 100 feet, in the blackest of nights with a billion stars shining as a backdrop, was a SAR helicopter from the Canadian Forces. Its turbine exhaust was spewing forth a blue flame, the rotor wash rocked my floatplane and its searchlight was blinding. I was unable to contact them on the radio to tell them I needed another battery. So they lowered a SAR technician down on a winch to find out if all was OK. I notified the SAR technician nobody was hurt and passed on my request for another battery.

The next morning another floatplane flew in with an extra battery. The weather had cooled and the takeoff was a nonissue. All passengers were delivered safely back to base, albeit a day late.

So what did I learn? Number one: takeoff performance can be seriously degraded due to hot, humid weather. If in doubt, look at your takeoff charts and carefully calculate your takeoff for the conditions of the day. Number two: ground effect is more pronounced than most pilots realize, especially light aircraft in hot, humid conditions. Ground effect may help you or, in my case this day, may hurt you as your expectations exceed reality.

This story does have a happy ending; no one was hurt and the remainder of my summer float flying went uneventfully. I ended up joining the Canadian Air Force and to this day I still love what I do for a living, flying! ☐

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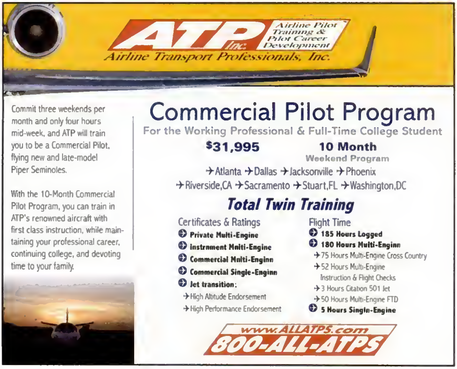
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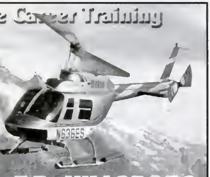

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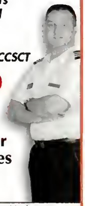

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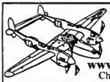

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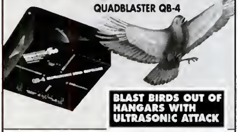

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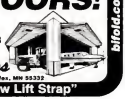

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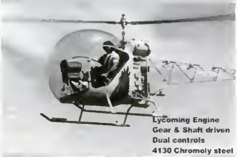

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When the Wrights returned to Dayton in the fall of 1902, they immediately set to work on designing an entirely new flying machine. They called it their *Flyer* to distinguish it from their previous gliders, for it was indeed much more. This machine, they knew, needed a much stronger and more rigid structure to carry the weight and withstand the vibrations of propellers and its powerplant.

The *Flyer* first took shape in a preliminary sketch Wilbur drew on brown wrapping paper, showing the top, side and front views of the machine. It was much larger and heavier than its predecessors—seven feet high, 19 feet 9 inches in length, with a weight of 605 pounds (without pilot), sporting a 40.3-inch wingspan and over 500 square feet of total wing area. Compared to earlier, more graceful gliders, it was a rather ugly duckling, more squat and stumpy.

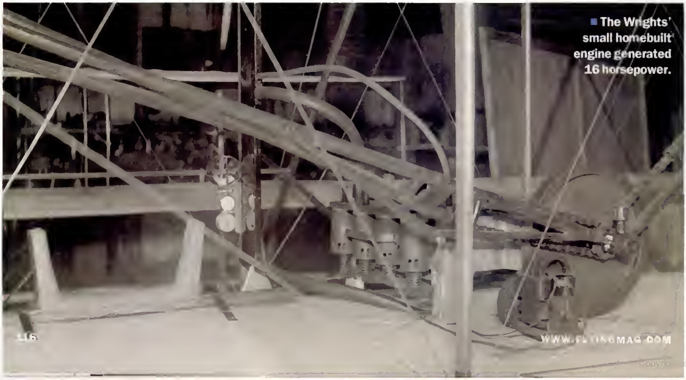
The *Flyer* was also sturdier. The ribs were built up of two pieces of wood, tacked and glued in place over supporting blocks. The end bows were pieces of specially bent wood used in carriage building, and the Wrights covered the wings, top and bottom, with a tightly woven muslin known as "Pride of the West." It came straight off the bolt, with no additional doping to make it more airtight.

Each wing was built in three sections, with final construction to take place once they had arrived at Kitty Hawk in the fall. The two outer bays were warped, but this time the central bay, which had to support a pilot, engine and drive mechanism, was rigid by necessity. A hip cradle provided wing-warping and rudder operation, and there was a hand control for the elevator, a double-surfaced design the Wrights hoped would carry a big part of the flight load, especially in the first moments off the ground.

There were two other significant changes. Most distinguishable was the droop of the wings, which appeared too weak to support their weight, the tips being a full 10 inches lower than the central wing section. This droop was deliberate, meant to minimize wind gusts from the side. Not as noticeable was the lack of symmetry. The *Flyer*'s right wing was four inches longer than its left. This, the Wrights realized, was needed to provide additional lift for the motor and accessories, which were 50 pounds heavier than the pilot, who lay on the left side of the central section.

The Wrights were excited, throughout the summer, as their "whopper flying machine," as Orville called it, began to take shape. This trip to Kitty Hawk, they knew, would be unlike those of the past. Before, the emphasis had been on testing new theories and verifying the results of testing done the previous winter. This time their goal was different. Success would be nothing less than getting a powered machine off the ground and sustaining and controlling its flight.

This "Kitty Hawk Moment" is brought to you by the EAA, whose Countdown to Kitty Hawk program, presented by Ford Motor Company, includes an exact flying reproduction of the Wright Flyer. *It is the centerpiece of the EAA's national tour during 2003, which will conclude with a five-day celebration at Kitty Hawk, North Carolina, where the Wright* Flyer *will fly again at exactly 10:35 a.m. on December 17, 2003, commemorating 100 years of powered flight.* ☐



■ The Wrights' small homebuilt engine generated 16 horsepower.

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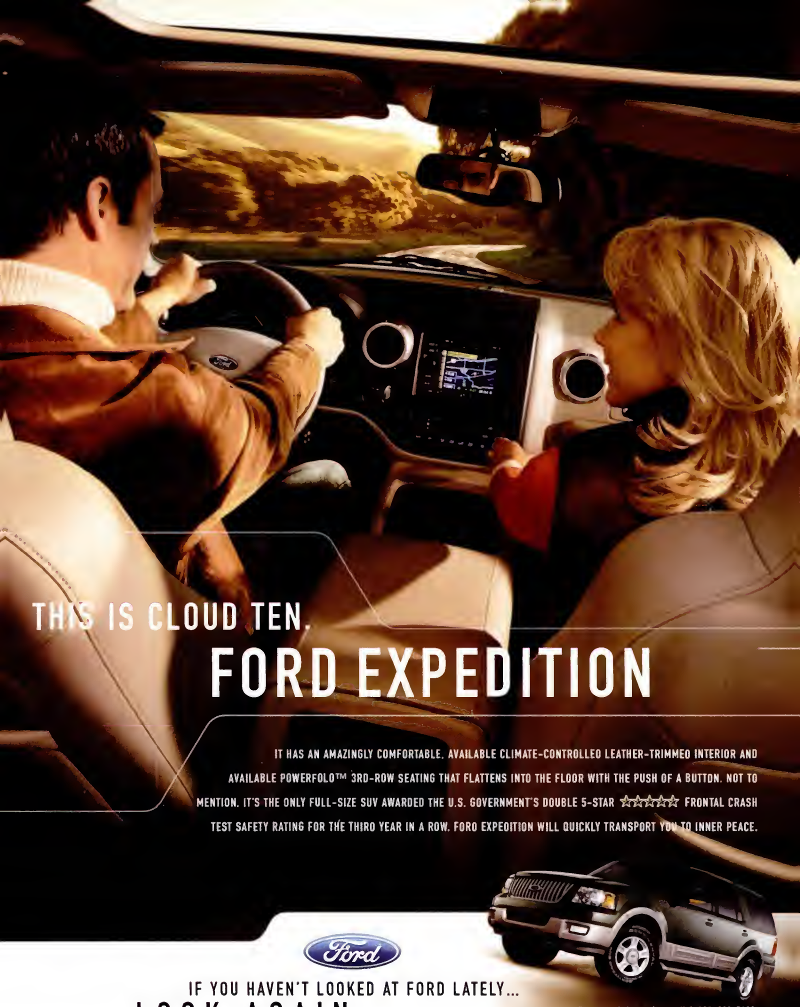

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